1864 Vol. XLVI SEPTEMBER 14th, 1944

FLIGHT

and

AIRCRAFT ENGINEER

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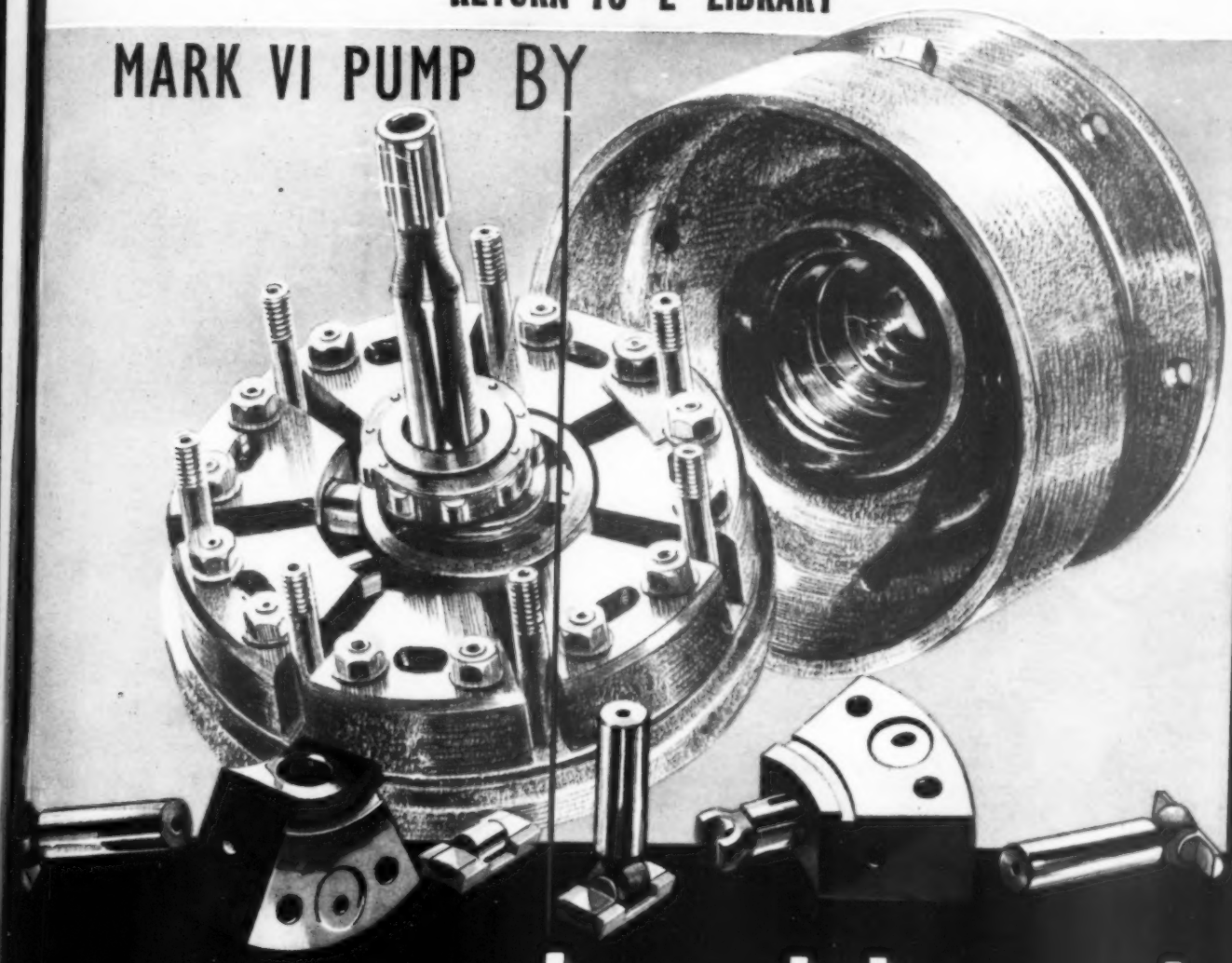

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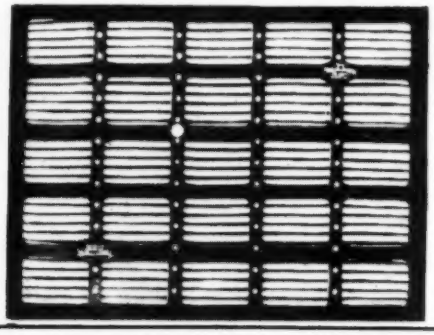
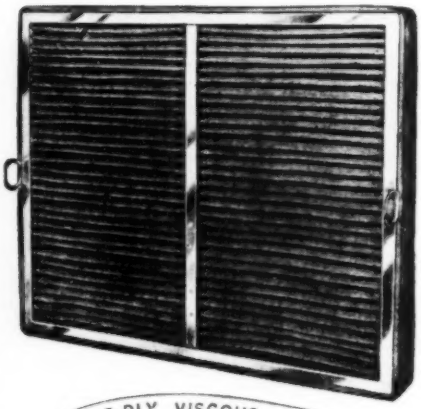
AEROVEE FILTER ELEMENT





THREE-PLY VISCOUS TYPE FILTER ELEMENT

From an article in "Flight" (February 24th, 1944) by C. G. VOKES, A.M.I.Mech.E., A.F.R.Ae.S., M.S.A.E., M.I.A.E., Managing Director, VOKES LTD., LONDON. S.W.

VOKES AIR FILTERS ARE ALSO FITTED TO MANY AERO ENGINE TEST BEDS

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IS IN THE AIR
The Stygian darkness of the night is o'er
And high above the sounds of waking life
There comes the deep reverberating roar
Of Victors homing from the strife.
Symbolic dawn of better things to come,
Of freedom's triumph and of prospect fair
Of peace and goodwill, happiness and home....
For Victory is in the air
HERE'S TO 1944
TECALEMIT LIMITED
GREAT WEST ROAD, BRENTFORD, MIDDX. Phone: EALing 6661 (16 lines)
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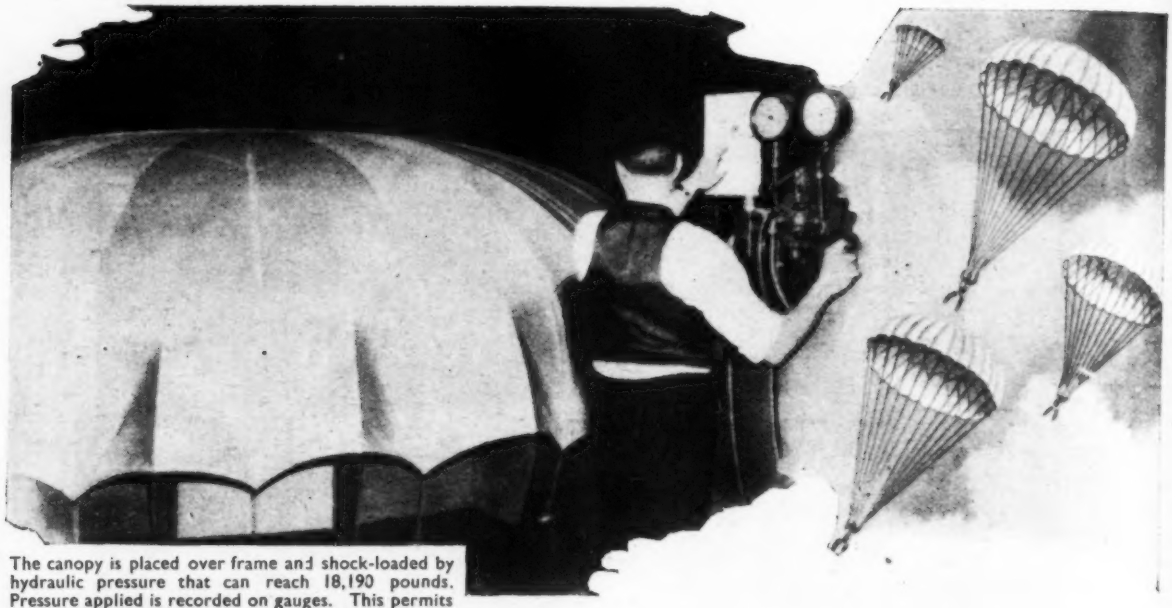

The canopy is placed over frame and shock-loaded by hydraulic pressure that can reach 18,190 pounds. Pressure applied is recorded on gauges. This permits close range study of weaknesses in the fabric, seams or lines that may occur under abnormal pressures.

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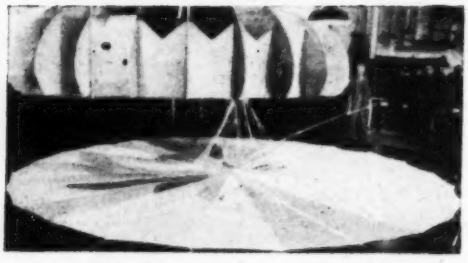
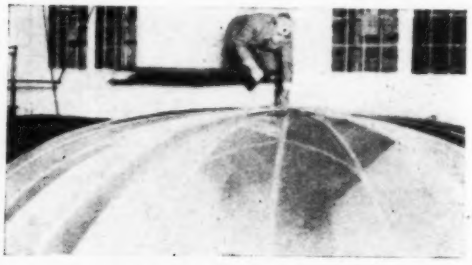


The canopy is spread on the floor. Each suspension line under 20 pounds of radial pressure permits close check on design, pattern, construction and dimensions of canopy.



The vent of canopy is being closely examined to ascertain any weakness that might occur in actual operation.

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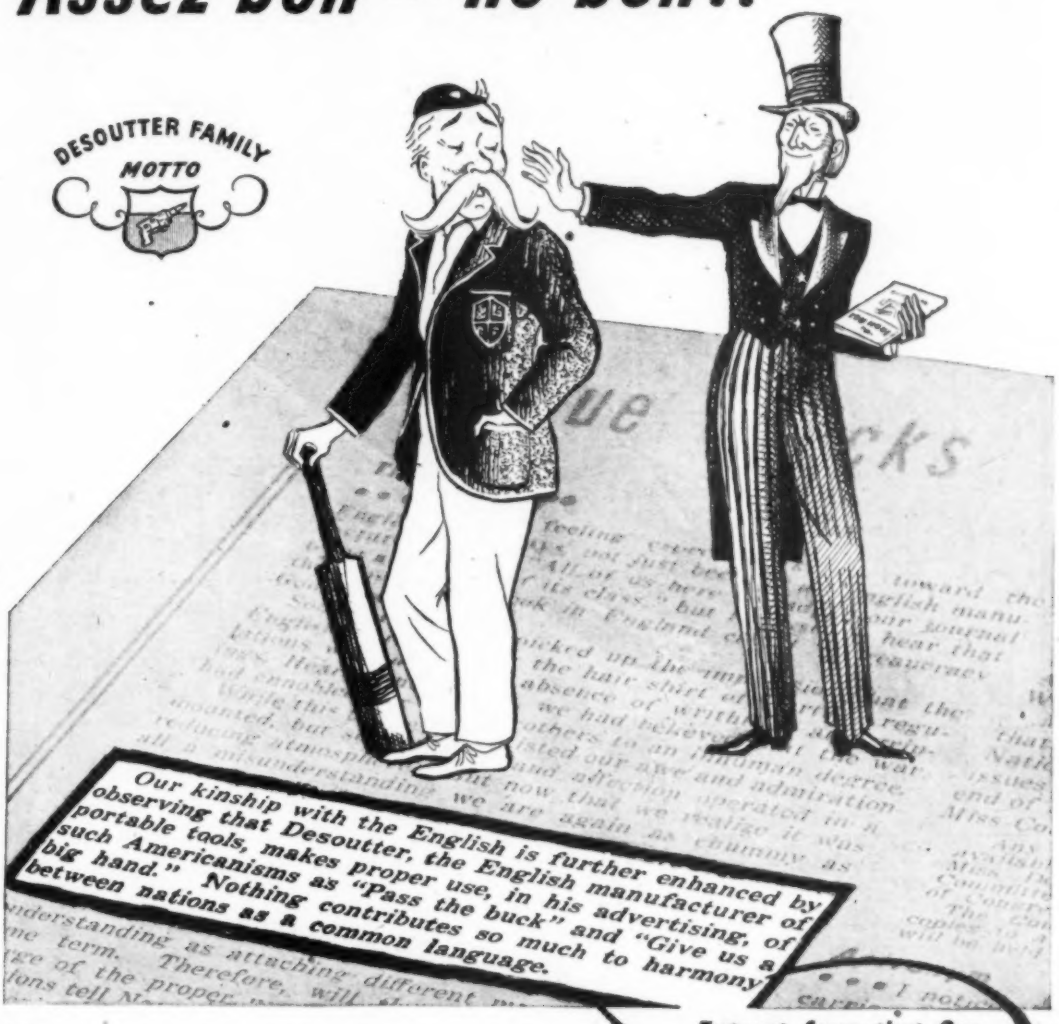
Assez bon — no bon!!


DESOUTTER FAMILY
MOTTO
Our kinship with the English is further enhanced by observing that Desoutter, the English manufacturer of portable tools, makes proper use, in his advertising, of such Americanisms as "Pass the buck" and "Give us a big hand." Nothing contributes so much to harmony between nations as a common language.
Extract from that fine American journal, "The Iron Age"

Our jolly old cousins are dashed sportin' but reahlly doncherknow, the compliment is due to them. We don't care whether a phrase or a component or any other bally thing is American or British. We just ask: "Is it the best we can find for the purpose?" That's why we use an occasional American crack in our advertisements—and for that matter an American type chuck in Desoutter Tools. It all fits in with the old Desoutter family motto. Assez Bon—No Bon!! For the benefit of cads on the classical side our Managing Director (who got a certificate for French at Night School) says it is a snappy French way of saying that nothing but the best is good enough for a Desoutter. Jolly old Uncle Sam seems to believe in that motto too for—until we needed the bally things so badly at home—we sold lots of Desoutter Tools in the States. And, Gad Sir, if you can export coal to Newcastle it's got to be dashed good coal, what? Or are we boastin' again?

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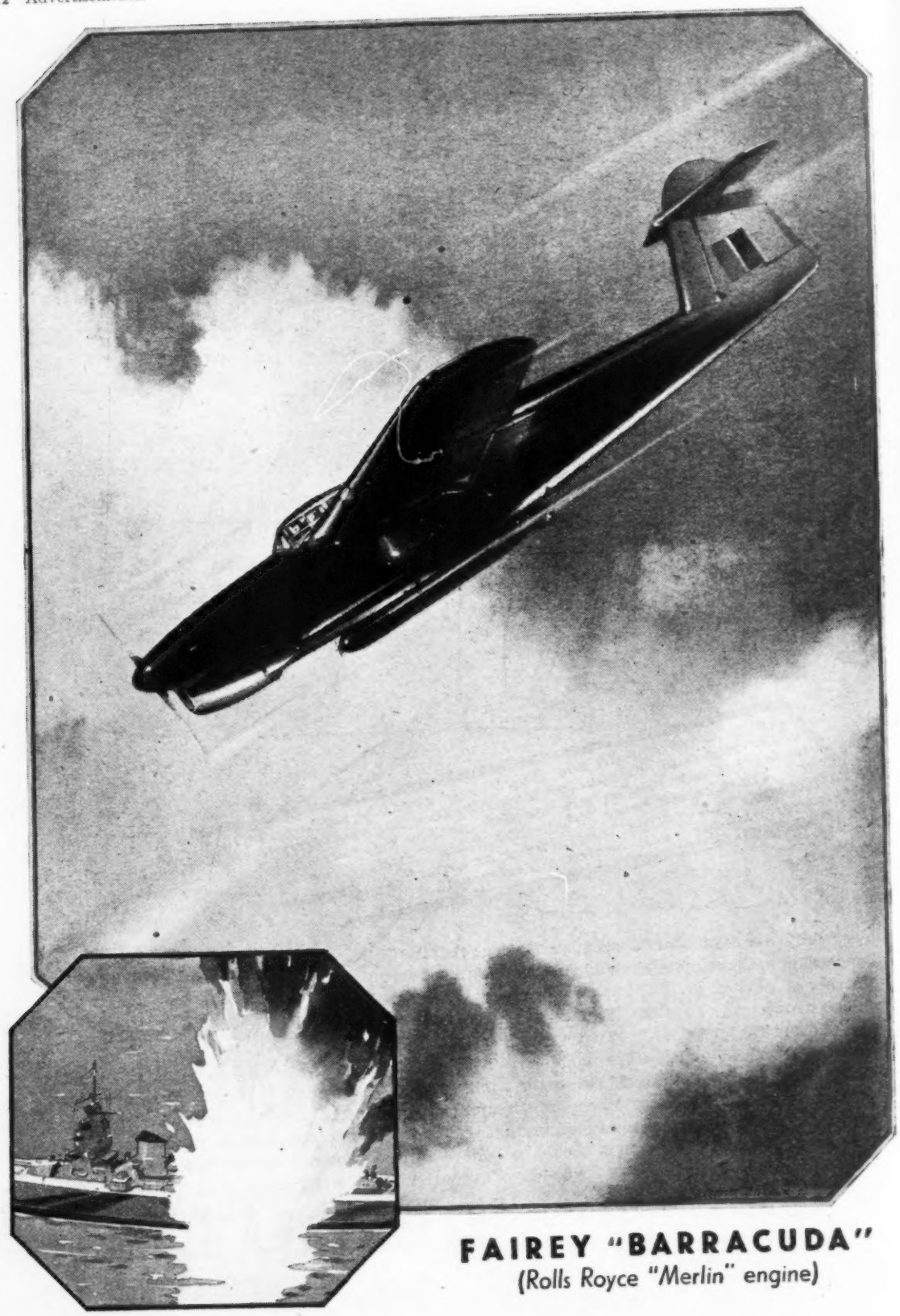

FAIREY "BARRACUDA"
(Rolls Royce "Merlin" engine)

FLIGHT
and
AIRCRAFT ENGINEER

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The Outlook

R.A.F. Mobility

IT used to be said, with truth, that while an aircraft could move faster than any other engine of war, a squadron of the R.A.F. was the most immobile of all things. This was particularly true when Britain was building up her Air Force in the Middle East, and all the ground equipment at least had to go all the way round the Cape. It is still true of squadrons of heavy bombers, for their ground gear is heavy and cumbrous. This does not matter so much now, as the range of the heavies is so great that it is seldom desirable to move them from their established bases. Lancasters, Halifaxes, Fortresses and Liberators still work from England, and can reach out across all Europe.

The problem which had to be solved in the African campaigns was to make the short-range fighters into mobile units. Unless their bases, with ground crews, spares, fuel and ammunition, could move forward at least as fast as the pace of the mechanised Army, the fighters would soon be left far in the rear of the fighting, and the Army would be without its necessary air umbrella.

That problem was solved, and when the desert was dry the solution did not prove too difficult. Tracts of level sand suitable for use as landing grounds were to be found on all sides. But once invasions of Europe began, the situation became more complex. However, the landing strips quickly solved that problem also. The beaches of Normandy had scarcely been seized when fighters crossed over the Channel and began to work from the strips. With the portentous dash forward of British and American armour, the squadrons of fighters and fighter-bombers had again to prove their mobility.

That they have proved it is shown by a recent case in which one Group of the 2nd Tactical Air Force advanced to new bases four times in less than a week. It was a remarkable performance, and reflects the greatest credit on all concerned, and especially on the ground crews who had to do the packing up. They must have been magnificently drilled in this rather complicated performance, and the toil must have been hard to bear. But when the men of the Royal Air Force set themselves to overcome difficulties it takes a great deal to hold them back.

Brighter Nights

NOTHING could have given a more emphatic "outward and visible sign" of the decisive defeat of the *Luftwaffe* than the decision of the Ministry of Home Security to relax to a considerable degree the black-out regulations over most of the country. In actual fact, the substitution of attacks by air torpedoes for bombing from man-directed aircraft was a confession that the *Luftwaffe* had failed to subdue the islands of the United Kingdom; but the advantageous significance of the change did not come home to the ordinary citizen of Southern England, when evacuation and disturbed nights became once more the rule—even if the said citizen's house did not suffer from blow or blast. The air torpedoes may still arrive in small numbers, but they cannot see the lights in streets and houses. The *Luftwaffe* may even try to stage another raid or two; but its power to beat London to its knees (not that it ever existed) has now patently been lost.

The black-out did not ever threaten to break the *moral* of Britain, but it, like the wailing notes of the warning sirens, was certainly depressing. When Mrs. Roosevelt visited this country and broadcast from here to the people of the United States, the completeness of the black-out was one of the things which seemed most to have impressed her.

It is salutary to look back now at the past four years.

The Channel once more prevented (as so often in our history) the enemy from marching an army into England and saved the country from the fate of Poland, France and other Continental countries. Hitler reckoned that if Fighter Command could be routed, his invasion barges, guarded by his bombers, might have defied the Royal Navy and forced a landing. The *Luftwaffe* was given the task of clearing the way. It was a new thing for that force to work on its own, and it made a poor showing. We all remember how the Hurricanes and Spitfires tore it to pieces. Then it tried to batter our great manufacturing cities and our ports into impotence. Again it failed, and the black-out played a great part in saving us. Now we are telling the world that the *Luftwaffe* has no longer any chance of breaking our power to manufacture and to fight.

At the same time the advance of our armies has reduced almost (but not quite) to nil the danger from the air torpedoes. They were able to defy the black-out, and so are really a different story. But Mr. Duncan Sandys has told us that in attacking the sites the British and American Air Forces together lost nearly 450 aircraft. If the *Luftwaffe* had been able to defend the sites effectively, our losses and the sufferings of London would have been much more severe.

None the less, the black-out brought in its train certain disadvantages. It increased the number of casualties on the roads at night, and it had its effect on work in the factories. Many of them permanently blacked-out their windows and kept work going by artificial light by day as well as by night. It will no longer be necessary to resort to that undesirable state of affairs. From the air point of view that is probably the most important feature of the decision to relax the black-out regulations.

Preparing for Peace

ALTHOUGH no one can yet foretell when the war with Germany will end, and although there is still an unfinished war in the Pacific to be liquidated when Germany has been occupied, recent events on the west front are such as to lead inevitably to a survey of British industries and their prospects when peace comes. From such a survey one derives scant satisfaction. As Mr. W. C. Devereux said in a recent letter to *The Times*: "It is incredible that at this stage no plan is available and no facilities are granted for industry to help solve its own difficulties and that no steps are being taken by those in authority even to measure the country's resources that are available for entering into the peace phase."

Two other industrial leaders have touched upon similar problems. Both, as it happened, were speaking to Rotary Clubs. Mr. R. C. Rootes, at Wolverhampton, threw out the suggestion that some of the "shadow factories" should be kept for their original purpose, but that others might be made available to other industries.

Sir Miles Thomas, vice-chairman of the Nuffield Organization, was in somewhat more optimistic mood when speaking to the Cardiff Rotarians. His view was that never in the history of mankind has there been so much to be done, and he was sure that we should set about our post-war problems with courage, but free enterprise must be enterprising; courage was not enough.

All three views are true, and they are reconcilable. The chief proviso is that the Government should make known its intentions. In the air world, particularly, no policy whatever is discernible. The two air chiefs, Sir Archibald Sinclair and Sir Stafford Cripps, have not so far dared to go beyond generalities. The time has come for a plain statement.

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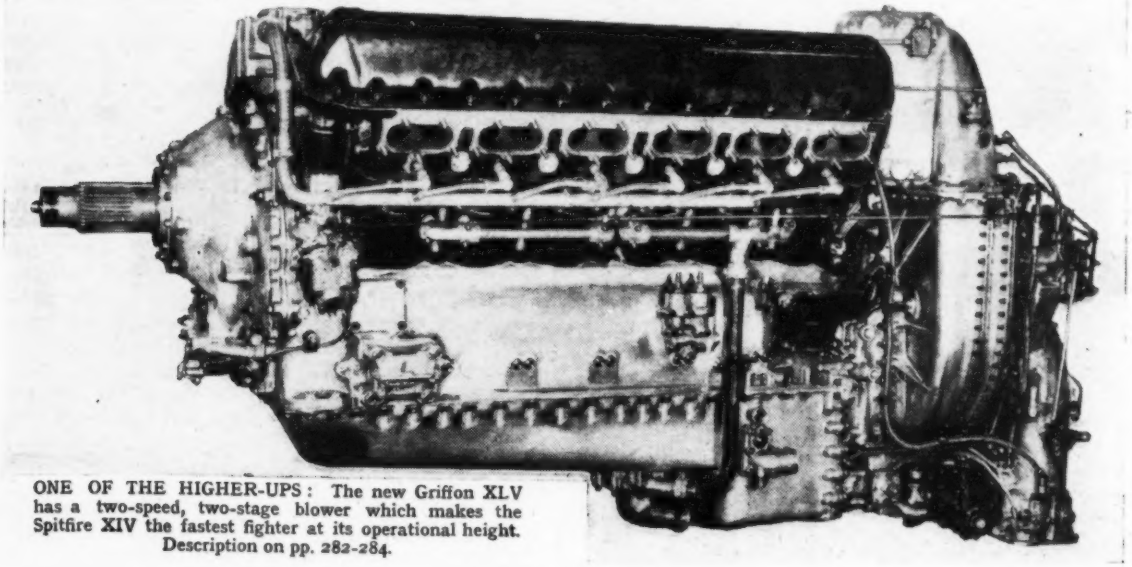


ONE OF THE HIGHER-UPS: The new Griffon XLV has a two-speed, two-stage blower which makes the Spitfire XIV the fastest fighter at its operational height. **Description on pp. 282-284.**

An impression of the composite Me 109/Ju 88 operated by the Germans. The Ju 88 carries explosives only and is released over the target by the pilot of the Me 109.

WAR in the AIR

The Fleet Air Arm off Norway : Bombing the Channel Ports : Success of Mosquito Night-fighters : Modern Cavalry in the Pursuit

IT is said that Herr Adolf Hitler is insensible to feminine charms. If that be true, he would not be much interested in a song about a Roman lass named Lalage. None the less, in that song, which Kipling puts into the mouth of a centurion, there are lines which might well be spoken (hardly sung) just now by Herr Hitler. The song starts:—

"When I left Rome for Lalage's sake
"By the Legions' Road to Rimini. . . ."

And it concludes:—

"And I've lost Britain and I've lost Gaul
"And I've lost Rome, and worst of all I've lost Lalage."

If Adolf has anything more to lose (Berchtesgaden, for instance), he will certainly lose it before long. Suggestions have been made that a very comfortable long-range aircraft has been prepared to take Adolf, Hermann, Göbbels, Himmler, and a select party of other scoundrels off non-stop to the Argentine. It must have been a disappointment to them to hear the other day that the Argentine, as well as Sweden, has publicly announced that it will not receive and harbour war criminals of that type.

The Fleet Air Arm has been active again. In the last week of August Admiral Sir Henry Moore, K.C.B., C.V.O., C.-in-C. of the Home Fleet, took a force of carriers, with suitable escort, to the coast of Norway, and the aircraft proceeded to attack all useful targets in the vicinity. The poor old *Tirpitz* was attacked again with both medium and large bombs, and was believed to have been further damaged, though a smoke screen prevented close observation of the results. One gallant pilot, Lt. Cdr. R. H. Richardson, after using up all his ammunition, lowered his arrestor hook, came down low, and tore off the aerials of a wireless station. Next day his Hellcat was hit by *flak* and this very gallant officer was killed. The operations lasted for several days and 11 naval aircraft were lost. The frigate H.M.S. *Bickerton* was torpedoed and sunk. Barracudas, Hellcats, Seafires, and Corsairs, all took part in the operations. One enemy anti-aircraft vessel blew up, a destroyer and a tanker were set on fire, and at least 16 other vessels were damaged.

The part played by the *Luftwaffe* was not remarkable. Five enemy aircraft were shot down by our fighters, four more were destroyed on the water, and two others damaged. In addition, several more were either destroyed or damaged on the ground. On the other hand, the *flak* was intense.

This was the largest operation in which naval aircraft have played the chief part, and it may be the last considerable naval engagement of the war against Germany.

Brest and Le Havre

THERE must be many air crews in Bomber Command to whom the word Brest will always recall the period when the *Scharnhorst*, *Gneisenau*, and *Prinz Eugen* were sheltering there and had to be kept under an almost nightly rain of bombs to prevent them from getting loose into the Atlantic to play havoc with Allied

WAR IN THE AIR

convoys. In those days, the *flak* at Brest was considered to be the most intense in the world.

Now Brest is being bombed again by Bomber Command, and also by the U.S. 8th Air Force. But the conditions are very different from those when the German warships were there. An American force has been attacking the place from the land, and the German garrison has never had any chance of escape. No doubt there is *flak* there still (supposing that the garrison is still holding out when these words are published), but there has been no special mention of any great intensity.

The Germans in Le Havre have also made a determined stand against the besieging Canadians, and here, too, the heavy bombers have been in action against the defences. Le Havre would be the more useful port of the two to Gen. Eisenhower as his armies move eastward. Antwerp fell into British hands last week, and will be the most useful of all when the mouths of the River Scheldt have been cleared of the enemy. Sea transport should do much to ease the supply problems of the racing mechanised armies.

It has been amusing to read that some German detachments may have been contemplating an attempt to escape by sea from Dunkerque. That would be poetic justice; but we can hardly believe that such an attempt could be made in the face of Allied naval and air supremacy.

AN OUTSTANDING WEAPON: Loading a Typhoon with explosive-headed rocket projectiles. The R.P. Typhoon is one of the decisive weapons of the war.

The technique of night-fighting has made amazing strides of late. When the R.A.F. began to send up night-fighters for the first time during the great blitz of 1940-41 not much was expected of them by the suffering Londoners. We were all told that if a raider was not shown up by searchlights the fighters' chances were much like hunting for a needle in a stack of hay. But progress was swift, and when the defences (guns and fighters) brought down 30 Germans in the last great London raid on May 30th, 1941, everybody thought it a wonderful achievement; and it certainly was highly creditable.

But there has been still more progress since then, and in the first 12 weeks after the landing on D-day, one base-defence Group of night-fighting Mosquitoes of the 2nd Tactical Air Force shot down no fewer than 174 enemy aircraft over the battle area. As the Germans were none too fond of showing up in daylight, this contribution was most welcome.

In the meantime Gen. Spaatz's 15th Air Force, based in the Mediterranean, has been smoothing the path of the advancing Russians by bombing targets round Belgrade and Budapest, as well as other places in the Balkans. In the fighting round Warsaw the Red Air Force has been taking heavy toll of men and vehicles as they tried to cross the River Narew.

TIME TO BE OFF: A Mosquito fighter-bomber crew go aboard. In case of necessity the fuselage door can be jettisoned and the orifice used as an escape hatch.

The V Weapons

AS Field Marshal Montgomery's 21st Army Group has pushed rapidly through the Pas de Calais and into Belgium, so many launching sites for air torpedoes have been overrun that war correspondents now hardly trouble to stop their jeeps and have a look at them. This push, naturally, greatly reduced the numbers which have arrived in the south of England.

Some interest was aroused a few days ago when two enemy aircraft arrived which were supposed to be the lower components of the Me 109-Ju 88 composite aircraft. They did little damage and caused no casualties. One would hardly expect any other result, except by chance.

The danger of any serious air attacks on Britain is now over, and black-out restrictions have accordingly been eased. That is not to say that there will be no more raids or no more loss of civilian life; but there is certainly now no chance of a deadly blow being struck from the air against the British war effort.

In the Pursuit

BAD weather at the week-end hampered the Allies' air operations on many parts of the Western Front, and the troops were mostly drenched by rain and had a very uncomfortable time. Discomfort matters less to soldiers flushed with victory and pressing on their foes. The retreating and

WAR IN THE AIR

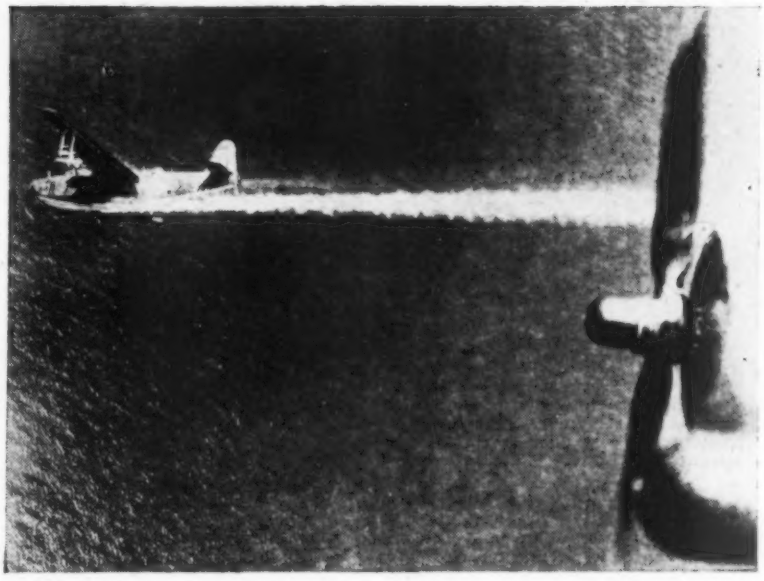
dispirited Germans must have been much more miserable.

Moreover, the Allied aircraft were not everywhere unable to fly. On one day the airmen spotted hundreds of German vehicles streaming along the road from Mons (the name recalls memories of another retreat in 1914) to Aachen. As the airmen watched, they saw Allied armour catch up the Germans and cut the lines of transport up. The aircraft circled overhead until the armour had pulled clear, and then swooped down to complete the rout. The number of vehicles destroyed ran into hundreds. It was a fine example of co-operation between the two modern successors to the horsed cavalry of ancient campaigns. Incidentally, horses are playing a part in the present movements, for the Germans are now short of both petrol and vehicles, and have seized large numbers of horse-drawn carts to take some of them back to the Fatherland. Hundreds of these carts and the poor beasts which drew them have fallen victims to the pursuing modern cavalry.

The Rats

SURELY there has never been such a strange war as this! As it becomes evident to everyone that the defeat of Germany is certain and must be accomplished soon, her former allies not only desert her and seek their own safety (which is perhaps natural) but each in turn declares war on her. Italy was the first to do so; then came Rumania; and now Bulgaria has followed suit. We may remember that Italy and Rumania were both on our side in the last war, and their peoples are more contented to "work their passage" than to serve bad leaders in a wrongful cause. But Bulgaria has always been on the wrong side ever since she fought Greece and Serbia in 1913. Her devotion to Russia is the only thing in her favour, and the Soviet has known how to deal with her.

The Yugoslav patriots have been marching up to join forces with the advancing Russians, and Allied bombers from Italy have been cutting the main railway line from the Balkans to Hungary, and keeping it cut. The German divisions still south of the Danube must be getting an uncomfortable feeling in the seat of their pants.



DOWNED: A four-engined Kawanishi reconnaissance-bomber flying boat (Emily) on fire after being shot up over the Pacific. The Emily has a span of 124ft. and a length of 96ft. 6in.

POINT BLANK: The fight between a Catalina and a U-boat when F/O Cruickshank won his Victoria Cross. The official citation appears on page 295.

An Acknowledgement

ON the whole the men and women of the Balloon Command have received very little credit for their work in this war, and they really deserve a great deal. Their job has been boring, uncomfortable and not without danger. Yet they have saved many places from the horrors of machine-gunning by the modern Huns.

It is therefore pleasant to learn that in the battle with the air torpedoes the balloon cables destroyed no less than 278 of the pests. Any Londoner can picture the amount of damage which those 278 air torpedoes could have done if they had reached London. No less than 2,000 balloons were massed in the barrage against the robot bombs. They were drawn from all over the country, and some were even brought by sea from Scapa Flow. The crews worked splendidly, and in some cases had their barrage in order ahead of the date fixed for them by the authorities.

A considerable section of the 2nd Tactical Air Force had moved its bases up into Belgium by last week-end. Naturally the fighters and fighter bombers led the way, and they received a great deal of help from the Belgian "White Army," which prevented the Germans from wrecking a number of the airfields before they retreated. The remnants of the *Luftwaffe* have sometimes showed up in strength, but would only fight if the conditions seemed quite favourable.

Both American and R.A.F. fighters have encountered the new jet-propelled Me 262, named the Swallow. The Allied pilots said that the German pilots seemed inexperienced and handled their machines clumsily.

HERE AND THERE

Appointment

MR. ERIC GREENWOOD, for many years in the test-flying department of Armstrong Whitworth in association with Mr. Turner Hughes, has been appointed chief test pilot to the Gloster Aircraft Co.

Paris-Toulon Air-mail

THE postal air service has been resumed between Paris and Toulon, Brazzaville Radio recently reported.

A regular service is expected to start again shortly between Toulon and Algeria.

Workers Formally Thanked

TO commemorate the overhauling of the 10,000th Merlin aircraft engine, individual employees concerned at the Sunbeam-Talbot factory were recently presented with a message of thanks for their efforts by the management.

Troop-carrying Record

MEN who joined up in the 6th South African Armoured Division's recent recruiting drive were ferried on a 4,000-mile flight in troop-carrying aircraft from Pretoria to an advanced camp in the Middle East to complete their training.

This is the greatest movement of Army reinforcements by air in South Africa's military history.

"Flight" Index

FLIGHT Index for January-June, 1944, is now available, price 1s. 1½d., post free, or together with binding case at 4s. 10d., including postage. Readers' copies can be bound in the publishers' case with index for 13s. 3d., which includes postage for returning the bound volume.

Brazil to Buy Canadian Planes

COMMANDANT RUY DE COSTA Gama and Robert Taves, heads of air lines in Brazil, arrived in Montreal recently to negotiate the purchase of transport planes for opening a new Brazilian airline to serve the interior.

They said that the new airline would link other key lines transporting goods, passengers and mail, and they propose to purchase eight machines now.

Barrow Tries Too!

FLIGHT of August 17th referred to the eagerness of north-western coast towns to set up each its own airport.

Liverpool, Southport, Blackpool, Fleetwood and Morecambe have already expressed their interests and hopes.

Now Barrow-in-Furness, Lancashire, has formed a development committee, one of whose major suggestions is to establish an airport. This is contained in a report made by the Mayor of Barrow and Sir Jonah Walker-Smith, M.P. for the borough.

NICE CUPS 'O TEA: No less than 2,200 gallons of tea, and 1,400 gallons of lemonade were consumed at the Malcolm Club during the first fortnight, when it was opened in an 11th century castle in Normandy for the 2nd Tactical Air Force. This picture, taken on the opening day, shows Lady Tedder, its organiser, on the pillion of L.A.C. J. W. Walker, of Notts, Mrs. Malcolm talking to Group Capt. R. G. Walden, and (centre) L.A.C. J. Morley, of Yorks. The fact that 30,000 men visited the club during the same period proves its value.

Air Mail Service in India

SERVICEMEN'S overseas and inland mails are now carried by air in India wherever R.A.F. services exist.

One result of the innovation is a record transit time of six days from the United Kingdom to India. An air letter posted at a village in Yorkshire was delivered to an officer in New Delhi in the same week.

To Beat the Japs

REORGANISATION of the R.N.Z.A.F. was recently announced by Mr. Frederick Jones, the New Zealand Minister of Defence, who referred to the still more active operations against the Japs which the Force was undertaking.

A New Zealand Task Force, he said, was being formed for forward operations in the Pacific, consisting of bomber and fighter units with appropriate ground services.

R.N.V.R. Officers' Club

THE RT. HON. A. V. ALEXANDER, First Lord of the Admiralty, is to perform the official opening ceremony of the new King Alfred Club for R.N.V.R. officers now housed in the old Marlborough Club premises at 52, Pall Mall, opposite St. James's Palace, next Wednesday, September 20th.

The building was damaged by enemy action last February, but was repaired, and the club is already functioning. Organised and financed entirely by R.N.V.R. officers, it provides accommodation, meals, and the usual club facilities at extremely moderate prices.

Chance for Aeromodellers

NATIONAL competitions with more than £300 in cash prizes, and a large number of silver trophies and other awards, have been organised by the Association of British Aeromodellers to take place next year.

Nothing on this scale has ever before been arranged in this country in model aircraft engineering, and it is claimed by the Association that it will bear comparison with the contests held in the U.S.

New clubs are constantly being formed in Britain where model aircraft enthusiasts now exceed 500,000.

Last of the "Blackfish"

FOUR years' production of the Fairey Swordfish at the Blackburn factory came to an end on August 18th when the last Fleet Air Arm aircraft of this famous line was completed and handed over to an A.T.A. pilot for delivery.

The occasion was marked by a little ceremony at which workers and staff gathered to see the last "Blackfish" take off from the factory's airfield.

Battle of Britain Sunday

THE anniversary of the Battle of Britain, the culminating engagement of which took place on September 15th, 1940, will again be commemorated this year by thanksgiving services next Sunday in churches throughout the country at which R.A.F. contingents, civil defence personnel, and aircraft workers will attend.

At Westminster Abbey the service will be attended by members of the R.A.F., Dominion and Allied Air Forces, and the Army and Navy.

The victory will also be celebrated at R.A.F. stations to-morrow by a colour-hoisting parade and a short service.

Heads of the churches have suggested that offerings at the Sunday services should be devoted to the R.A.F. Benevolent Fund.

Adding More Lightness

BY using spun glass as a sound-deadening and insulating material, Western Airlines (U.S.) save 71lb. in reconverting C-47 Skytrains back into DC-3 airliners. A further saving in weight is effected by fitting a new type of seat, bringing the total reduction to 157½lb.

Incidentally, it is claimed that the

HERE AND THERE

spun glass material is fire and moisture proof and doubles the insulation efficiency.

Sign of the Times

ANOTHER 20 or 30 transport aircraft, mainly Skytrains and Skytroopers, will probably be returned to American commercial airlines by the U.S.A.A.F. within the next month or two.

Some time ago Mr. Roosevelt raised the limit of commercial aircraft in operation from 200 to 300, and this limit is expected soon to be reached.

Weighty Argument

THE U.S. War Dept. has announced that U.S. Air Forces in all theatres of operations have dropped 677,012 tons of bombs, from "Pearl Harbour" up to July 1st, 1944.

The U.S. Strategic Air Force in Europe made some 59,000 sorties on 30 days in July last, and dropped over 73,000 American tons.

What the Pilot Says, Goes

THE Airline Pilots' Association of America has successfully opposed the suggestion advanced by C.A.B. to increase the take-off weights of the DC-3 and Lodestar.

The association contended that a heavier load could mean all the difference between safety and danger when flying in turbulent air, so C.A.B. has dropped the idea.

U.S. to New Guinea

A SAVING of between four and five hours in the flying time of Skymasters plying between the U.S. and New Guinea may soon be effected by routing them via the Marshall Islands instead of via Hawaii.

Carrying up to 11,000lb. of cargo, or 21 passengers in additiona to the normal crew of six, the C-54 averages 210 m.p.h. at 9,000ft. on this trip and covers the distance in about 41 hours.

Russian Greeting

AN Air Transport Command officer, recently returned to America after a tour of U.S. airfields in Russia, says that when an American lands, no matter if he is a private or a general, the Russians run out, grin broadly, and greet him with about all the English they know, which is "Hi, Jerk!"

"Brown Jobs" in Future

ALL R.A.F. personnel in France are being issued with khaki. The change-over was considered necessary because the dust experienced at the present season changes R.A.F. blue to a shade markedly similar to the German field grey.

The thought conjures up visions of R.A.F. motor drivers feverishly brushing themselves down at the approach of their own "Rockphoons" just in case of a little misunderstanding!

R.A.A.F. to be Cut

MR. A. S. DRAKEFORD, the Australian Air Minister, announced last week that no more Air Force personnel will be sent abroad for active service, or for training in Canada under the Empire Training Scheme, after the end of this year.

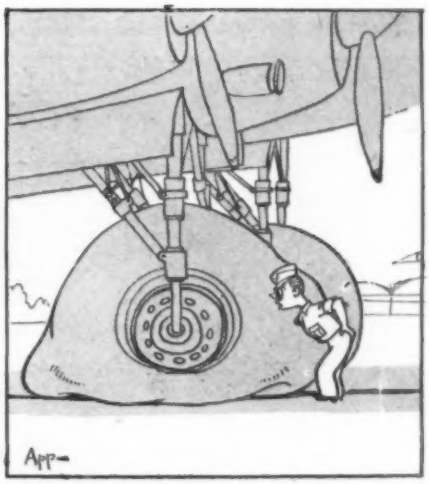
Air Force establishments are also to be cut down and the intake into the R.A.A.F. is to be diminished.

This news followed the announcement that 15,000 men were to be released from the Air Force for essential Australian industry.

Swedish Aviation

FOR the first time since the war began, a new internal airline was scheduled to start in Sweden last Monday. It links Malmo, Gottenburg, Stockholm and Lulea (North Sweden) by a daily service, but the Stockholm-Lulea section will be suspended for the winter as from November 15th. Aircraft used will be DC-3 or Ju 52 airliners.

The opening of an internal airline in a country where fuel supplies must have offered considerable difficulties during the war would appear to be significant at the present juncture.



"That would happen just when I was due for six days' leave."

Swords into Ploughshares

FIVE converted B-17 Flying Fortresses of the U.S.A.A.F., which had force-landed in Sweden and have since been loaned to the Swedish Government by the U.S., are to be used on a Sweden-United Kingdom airline very soon to be operated by the Swedes.

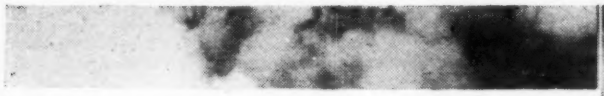
One B-17F which has already been made ready and christened *Sam* (delicate gesture) has had its nose lengthened by 3ft. to house the wireless operator and navigator, and the bomb bay adapted for baggage. The main cabin takes 14 passengers and there is also a little "smoker" for four persons.

CELEBRATION

Here is Group Capt. George Bulman getting into *The Last of the Many*, which was the name bestowed on the last of more than 10,000 Hurricanes to be produced by Hawkers. The occasion called for a little celebration with brief speeches by Sir Frank Spriggs, Mr. Sidney Camm, Mr. Oke and Mr. Jones, and George himself before he put the aircraft through its paces to round off the proceedings. He was accompanied in the air by Philip Lucas in a Hart, and Bill Hamble in a Tempest. Messrs. Swift, Stammers and Bound were also present to represent Rolls-Royce, Rotol and Dowty respectively.

The Supermarine Spitfire XIV

Two-speed, Two-stage Supercharged Griffon Makes Possible Yet Another High-altitude Version of a Famous Fighter



THINGS aeronautical move swiftly these days. In our issue of March 9th of this year we published the first illustrated description of the new Rolls-Royce Griffon engine, and on April 20th this was followed by an account of the first application of this engine to the Supermarine Spitfire XII low-altitude fighter. This combination proved a remarkable success, and it is thus perhaps hardly surprising that this week we are able to announce yet another development of this Supermarine-Rolls-Royce combination, although the time lag between the two is so short that few could have expected the new combination quite so soon. The fact that this "next step" has already been taken, and with as great success as that which attended the previous one, is very greatly to the credit of the initiative and energy of the two firms concerned.

While the Spitfire XII is designed to have maximum performance at low altitudes, and a very good maximum it is, the new type, the Mark XIV, is destined for higher spheres. The time has long since passed when it was thought that height was everything, and the low-altitude type of fighter has amply proved its worth. But there can be no guarantee that the enemy is not bringing out new types of fighters calculated to be a match for our present best at great heights. In fact, there has been evidence in recent months that such is the case. The Spitfire XIV may be expected to prove equal to the task of guarding against any surprises.

What has made the new high-altitude fighter possible is the introduction by the Rolls-Royce firm of a two-speed, two-stage supercharger for the Griffon. The original Griffon as fitted in the Spitfire XII is, it will be remembered, a development of the "R" engine used in the Supermarine Schneider seaplanes. The "R" engine developed 2,350 h.p. at 3,250 r.p.m. and weighed only 11 oz. per h.p. It is not, of course, to be expected that a service engine which has to run reliably for long periods is asked for such high specific output, but the Griffon may be assumed to be "in the 2,000 h.p. class" and to weigh less than 1 lb./h.p.

The version of the Griffon installed in the Spitfire XIV differs from that of the Mark XII in that, as already mentioned, it has a two-speed, two-stage supercharger. The Griffon in the latter aircraft has a two-speed, single-stage

Designed for high-altitude work, the Spitfire XIV has lost none of the manœuvrability of its predecessors. Pilots report the machine to be "smooth, highly manœuvrable and entirely without vices."

A variety of armament may be carried by the Spitfire XIV, such as four 20mm. cannon, two 20mm. cannon and two .5in. machine guns, or two 20mm. cannon and four .303 machine guns. Moreover, the drop tank can be removed and a 250 or a 500lb. bomb carried instead.

What has contributed in no small measure to the performance of the Spitfire XIV, apart from the Rolls-Royce two-stage Griffon, is the Rotol five-bladed airscrew which efficiently absorbs the great power of the engine. Good climb is thus combined with high ceiling and top speed.

THE SUPERMARINE SPITFIRE XIV

blower of the same type as that used on the Merlin XX. It is, therefore, logical to assume that the Griffon in the Spitfire XIV has a two-stage supercharger similar to that of the Merlin LXI, which has proved so successful in the Spitfire IX with an output of 1,650 h.p. and a speed at its operational height of more than 400 m.p.h. With an engine of greater capacity (the Griffon is of 36.7 litres against the Merlin's 27) it can safely be assumed that the Spitfire XIV is even faster than the IX.

Engine Details

With a bore of 6in. and a stroke of 6.6in. the twelve cylinders give, as already mentioned, a capacity of 36.7 litres. The compression ratio is 6:1 and there is a choice of airscrew reduction-gear ratios of 0.51:1 and 0.45:1 respectively. In spite of having a two-stage supercharger, the Griffon XLV is of relatively short length. This is partly due to the placing of the drives for the camshaft and ignition at the front of the engine. Dual ignition in one magneto unit achieves a clean layout of the wiring. Starting can be by either electric motor or cartridge starter. The starter is mounted on the reduction gear casing with transmission to the reduction gear. A drive for a remote gear box for various aircraft services is provided at the rear of the engine. For easy and uniform operation, interconnected engine, airscrew and ignition controls are fitted.

In order to prevent use of high supercharger gear at sea level, an automatic gear change comes into operation at the height at which maximum performance will be obtained at the prevailing airspeed. At the rear of the cylinder blocks is installed a liquid-cooled intercooler. Oil and fuel systems of the Griffon XLV are unusual. The oil is fed to all crankshaft bearings, thus minimising pressure loss and improving oil-flow control. The fuel feed control is of an improved type which ensures correct carburation during fighting aerobatics.

Yet one more feature has been responsible for the amazing performance of the Spitfire XIV. There is little use in adding more power and in developing that power by the engine at great heights if it cannot be converted efficiently into thrust. Here Rotols came to the rescue with their five-bladed airscrew. Ideally no doubt the six-bladed, contra-rotating type would give the best solution, but this would introduce not inconsiderable modifications to engine and airframe. That this type *will* come into quite extensive use is certain, but the Spitfire XIV was wanted quickly, and so the single-hub, five-bladed airscrew seemed to offer a very effective intermediate step.

At the speeds attained by fighter aircraft at altitudes of 30,000ft. and upwards, the four-blader cannot efficiently absorb the power of engines of the 2,000 h.p. class. Moreover, there is the question of limitations on diameter, partly dictated by airscrew tip speeds and partly by the question of undercarriage height.

The problem of the five blader appears relatively simple, but several problems were worrying the designers when they began to examine it. It was known, for example, that with the increase in the number of blades on a single hub, energy losses due to the rotational swirl of the slipstream would be present.

Unfounded Fears

It had also been thought that vibration troubles would be encountered due to the effect of reactionless modes of vibration which appear in airscrews of this type. This form of vibration is aerodynamically excited and can occur on four- or five-bladed airscrews, but not in the three-blader. It has the peculiarity that the blades vibrate in such a manner that there is no reaction present at the airscrew shaft, which tends to displace the shaft either laterally or torsionally. Since the vibration is contained entirely in the airscrew itself, no advantage can be taken of any inherent damping or energy-dissipation which may be present in the engine system. Hence it had been thought that resonance of this mode of vibration would cause prohibitively high stresses in the blades. This reasoning was, so far as present airscrew experience is concerned, proved unfounded, probably on account of the extra damping which is introduced by the additional number of blade-root fixings. Further, it appears from recent experience that the aerodynamic forces which tend to excite this form of vibration are small compared with other sources of excitation.

The use of the five-bladed airscrew gives a pronounced improvement in climb characteristics, at the same time giving very good efficiency at top speed.

The necessity for keeping down the weight becomes more apparent than ever with five-bladers, and intensive work on wood blade design is going on to give a performance equal to that of the metal blade by reducing aerofoil section thicknesses and cleaning up the roots to improve the airflow over the spinner.

As for the Spitfire XIV itself, the reinforced airframe of the Mark VIII was used as a basis for development, with the result that the new model could be put into production in a very short space of time. The forward lines of the aircraft were slightly modified to accommodate the longer engine, and special attention was given to surface finish, an expedient which has become possible by the sorry state of the *Luftwaffe*.

The result has been that the Spitfire XIV is faster than any other Spitfire in service, as has been proved in operations in the north-western European theatre of war. It has also been in action against flying bombs.

Operational Experience

The Spitfire XIV has brought disappointment to the pilots of the R.A.F. who have flown it deep into enemy territory in recent months. Knowing they were flying a fighter faster than any other Spitfire in service, they were anxious to test its undoubted qualities against the best the *Luftwaffe* could produce, but, unfortunately, combats have been rare. The qualities the R.A.F. pilots have recognised in the "Spit. XIV" have included an unequalled rate of climb and a high-altitude performance calculated to keep it above any fighter the enemy can put in the air. Pilots have reached over 40,000ft. in this aircraft.

"When you open the throttle," said Wing Cdr. R. W. Oxspring, D.F.C. and two Bars, "the new "Spit." leaps off the ground and at its height, there is nothing to touch it. It is the smoothest aircraft I have ever flown, highly manœuvrable and entirely without vices. I'm itching to get a chance to let the Hun see what it can do in action."

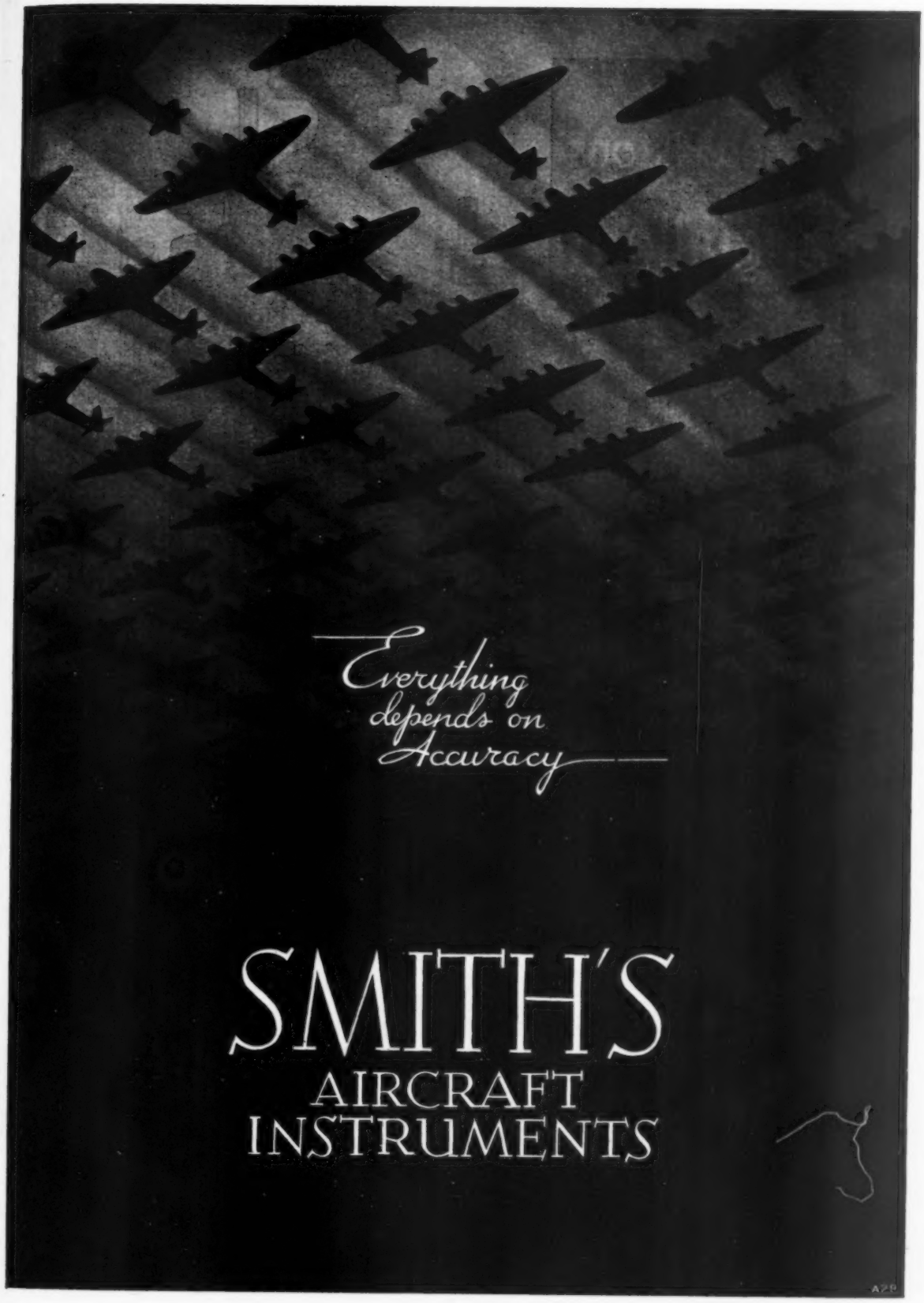
Prior to D-day the Germans had caught fleeting glimpses of the Spitfire XIVs as they flashed over enemy territory on weather and tactical reconnaissance; and particularly when they swooped suddenly down on rail or road transport. Absence of enemy opposition—they were attacked frequently enough by anti-aircraft guns—and supreme confidence in the speed of their aircraft has made the pilots particularly venturesome.

In a recent sweep over the Brussels-Antwerp-Bruges area one of the pilots was so tired of searching in vain for enemy aircraft in the air that he went right down "on the deck" and, as he put it, "Took a peep into the hangars at Antwerp." His further report was: "There didn't seem to be any there either."

Armament of the Spitfire XIV may be four 20 mm. cannon, two 20 mm. cannon and two 0.5in. machine guns, or two 20 mm. cannon and four 0.303 machine guns. In addition, a bomb carrier for either a 250 lb. or a 500 lb. bomb can be fixed under the fuselage in the drop tank fittings.

Main data of the Spitfire XIV are:

Wing span: 36ft. 10in.
Length o.a.: 32ft. 7.75in.
Wing area: 248 5 sq. ft.
Loaded weight: 8,000 lb. (approx.).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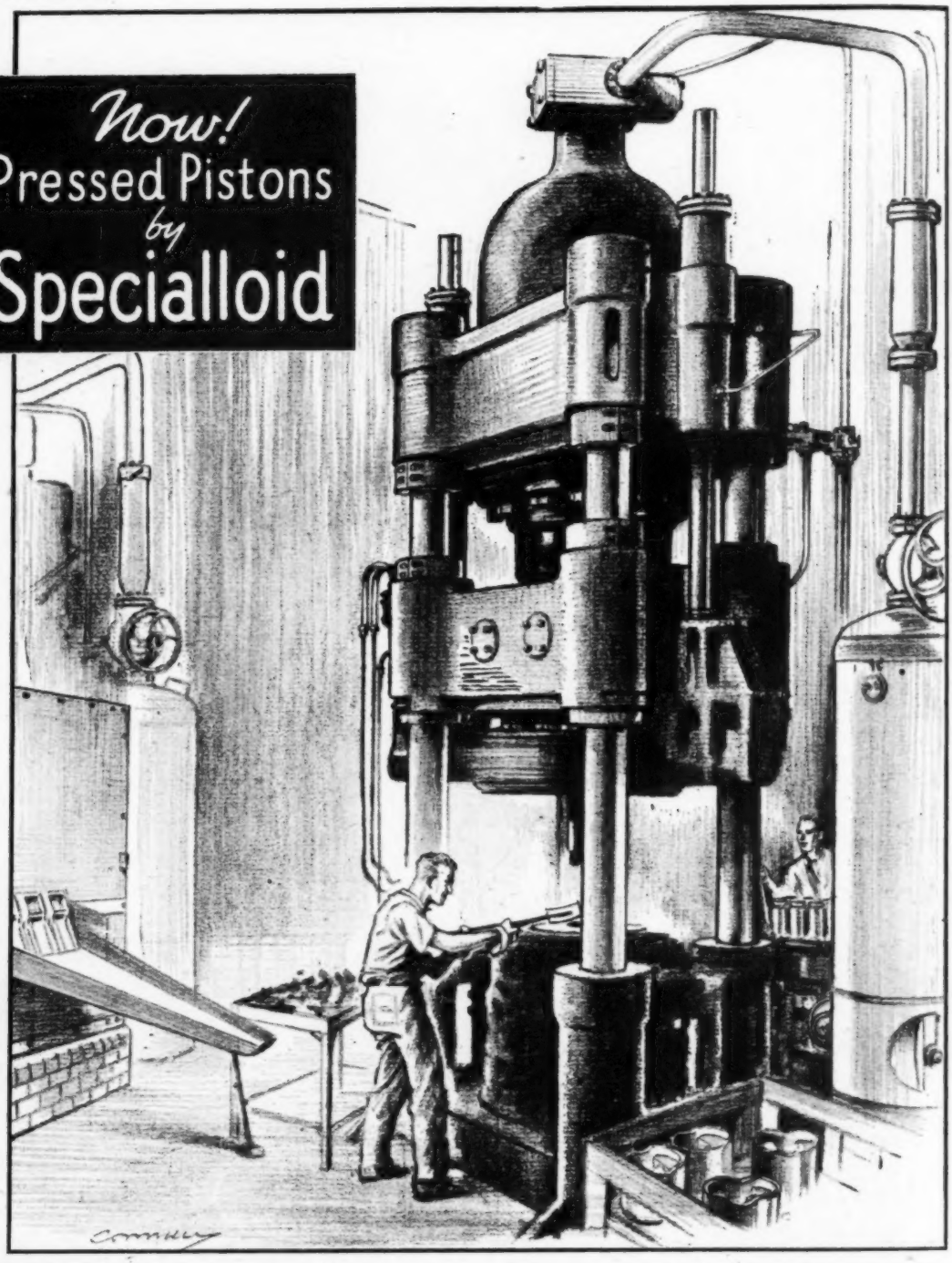
Now! Pressed Pistons *by* Specialloid



For a quarter of a century Specialloid technicians have concentrated exclusively upon the light alloy piston. Time and money without stint have been lavished upon its development—their faith in its ultimate success has never wavered.
To-day the light alloy piston stands supreme. Without it the internal combustion engine could never have attained its present peak of efficiency. But Specialloid still looks to the future. Once more it assumes the responsibility for leadership by being the first piston specialists in Britain to install its own giant presses for the manufacture of light alloy pistons.

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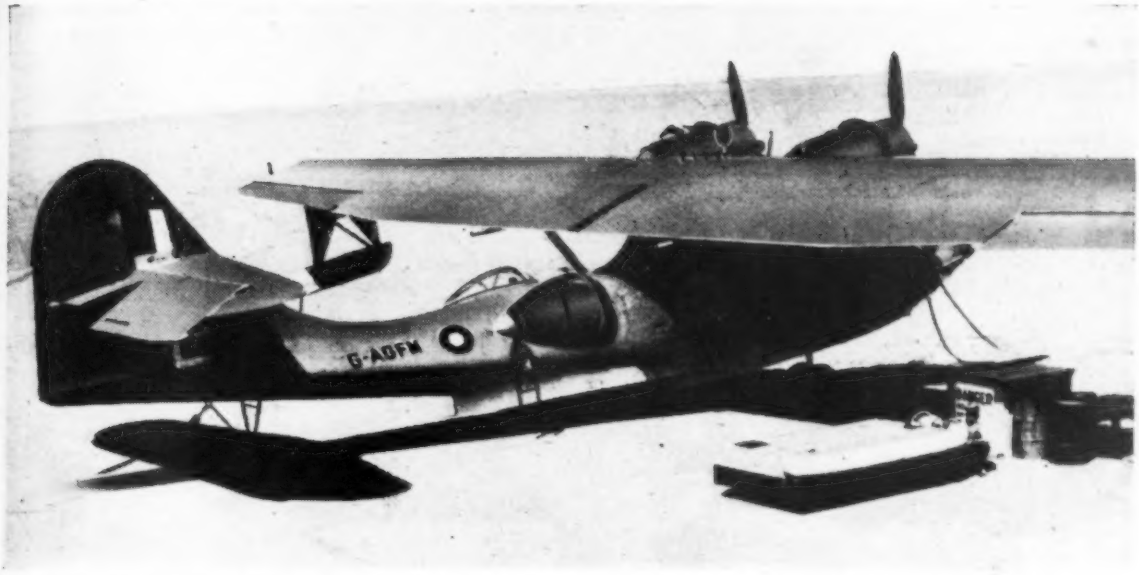


ON THE SLIPWAY: One of Qantas' Catalinas (*Altair Star*) at a marine air base in Western Australia.

World's Longest Air Route

Qantas Empire Airways' Indian Ocean Service : 3,500 Miles Non-stop with Payloads of 1,000-1,200 lb.

COMPARATIVELY little is known in this country of an air route which is claimed to be the longest in the world to be flown non-stop, and which has been in operation for more than a year. It is the Indian Ocean air service operated by Qantas Empire Airways and was inaugurated at the wish of the United Kingdom Government in collaboration with the Australian Government, for the purpose of speeding air communications between Australia, India, Burma, Middle East and England. Australia had been without direct air communications with Great Britain since February, 1942.

A few survey flights were made between Ceylon and Western Australia by a Royal Air Force flying boat squadron during June, 1943. Qantas Empire Airways personnel flew as supernumerary members of the crew prior to taking over and commencing the service.

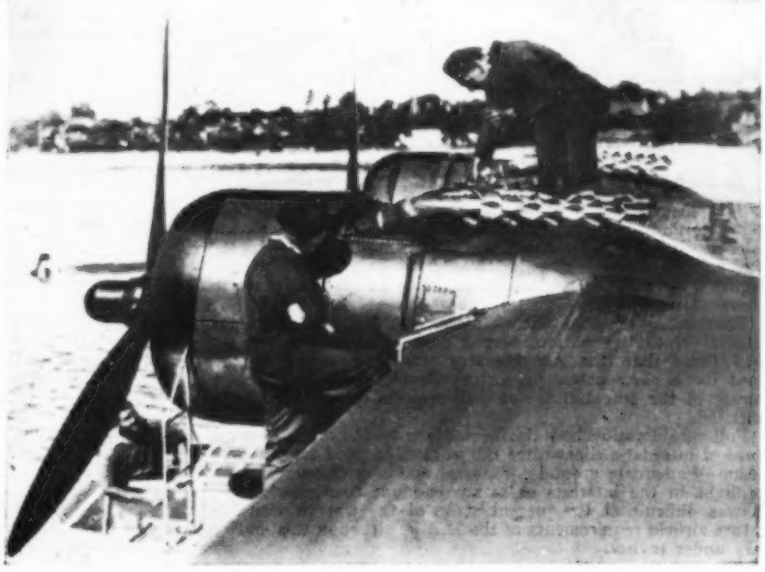
British Overseas Airways handed over the route to Qantas Empire Airways, and the first Qantas-operated service departed eastbound on July 10th, 1943, in the command of Captain R. B. Tapp. The first westbound service departed from Western Australia for Ceylon on July 22nd, 1943, also in the command of Captain R. B. Tapp.

From the outset a weekly frequency was maintained, then the acquisition of additional aircraft enabled the frequency to be increased and allowed for the service to be extended to Karachi. The first service to Karachi was flown by Captain W. H. Crowther on November 4th, 1943, and left again eastbound on the 6th.

The Indian Ocean crossing, over 3,500 miles, is claimed to be the world's longest non-stop stage to be operated by a regular service. The average time taken for each trip is approximately 27 hours.

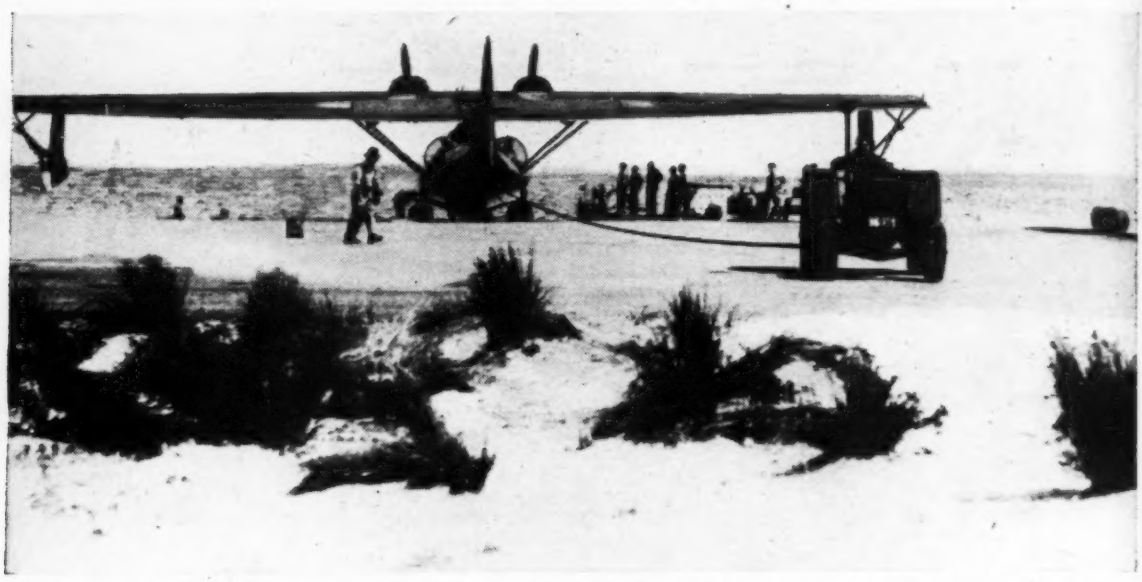
The service is maintained by a small fleet of Catalina aircraft. These are fitted with special long-range tanks which were installed by Qantas engineers at Rose Bay, where a special interior lay-out of chairs, etc., was designed and installed. Each Catalina has a fuel range of 36 hours when operated under heavily loaded conditions.

The all-up weight of each aircraft is 35,000 lb. The average weight of fuel carried is approximately 16,000 lb.,



REFUELLING : On the Indian Ocean run the Catalinas carry approximately 16,000 lb. of fuel.

WORLD'S LONGEST AIR ROUTE



ESSENTIAL BUT UNCOMMERCIAL AVIATION: *Altair Star* goes down the slipway for the 3,500 miles flight at an initial gross weight of 35,000 lb. and with a payload of 1,000–1,200 lb.

and the payload varies between 1,000 and 1,200 lb. The average number of passengers carried is three and the average weight of mail and freight carried is 500 lb.

Captain W. H. Crowther is in charge of operations. The nucleus of flying personnel and engineering staff was selected from Qantas Empire Airways' flying boat personnel and supplemented by trainee pilots and navigators from the Royal Australian Air Force.

All Qantas Captains on inauguration of the Indian Ocean Service had had experience in Catalina operations during 1941, when Qantas undertook the delivery of this type of aircraft from America across the Pacific to Australia.

The average complement on each service is a crew of six, consisting of Captain, First Officer, Second Officer, Navigating Officer, Radio Officer and Flight Engineer. Each crew member after making four return crossings of the Indian Ocean is entitled to wear the Company's Long-range Operations Star. Some members of Qantas Empire Airways qualified for this distinction during the Catalina delivery in 1941, in which operation three deliveries were necessary to qualify.

Each passenger on the Catalina service is issued with a document certifying that he has flown on the service and entitling him to membership of the "Rare and Secret Order of the Double Sunrise," as each flight occupies more than 24 hours in the air without alighting. The Catalina service is now being augmented by a faster service which will be known as the "Kangaroo" service.

Qantas Empire Airways Captains and First Officers engaged on the Indian Ocean Service are: Captains W. H. Crowther (Manager Western Operations), R. B. Tapp, L. R. Ambrose, O. F. Y. Thomas, D. F. MacMaster, J. L. Grey, R. J. Ritchie, H. T. Howse, J. A. Furze; First Officers M. J. Mather, H. H. Ross, H. G. Lee, J. W. Solly, J. A. Bird, F. S. Furniss, G Moreland, R. O. Mant, R. C. Senior.

The 100th crossing of the Indian Ocean by Qantas Empire Airways was made in the command of Captain R. B. Tapp, ten months after the inaugural service.

For security reasons no details of total number of flights, frequency of departure, passengers and mail figures, location of bases and emergency refuelling points may be published.

DEMAND FOR CIVIL AVIATION POLICY

THE airport section of the Association of Municipal Corporations decided in Manchester last week to seek an interview with Sir Archibald Sinclair, Air Minister, on post-war civil aviation. They have already published a report urging a Government declaration of policy and indicating their views on the subject.

The meeting was told that when Mr. W. P. Hildred, Director-General of Civil Aviation, met a deputation on July 13 he told them that the Air Ministry was well aware of the need for a clear policy on airport development and that a survey of the potentialities of civil airports had already been initiated.

Full consideration had also been given to the organisational form of internal airlines after the war. The need for the provision of adequate ground equipment and control over aircraft in flight in the interests of safety had not been overlooked. It was difficult at the present stage of the war to visualise future airfield requirements of the R.A.F. although this matter was under review.

ONE THOUSAND ATLANTIC CROSSINGS

BRITISH Overseas Airways Corp. last week celebrated the completion of 1,000 flights on the North Atlantic Ferry.

Its original object was to take from the United Kingdom to Canada the Transport Command air crews who deliver bombers here. It then became a regular air service carrying official passengers and freight in both directions.

It was in September, 1941, that the Secretary for Air issued directions to the Corporation to take over responsibility for the operation and maintenance of this vital service, and to run it to the requirements of R.A.F. Ferry Command.

The service has carried 332 tons of mail, 523 tons of freight and 11,378 passengers, with only one fatal accident.

NEW U.S. REFINERY

THE Co-operative Refinery at Coppeyville, Kansas, (U.S. Government-owned) which began working on 100-octane fuel in May last, has now sent off its first eight tank cars of fuel. This comprised 64,000 gallons for use on Fortresses and fighters, and was despatched to an undisclosed destination.

TEN F.W.'s IN THREE MINUTES

Squadron Leader Tommy Brannagan, 26 years-old Canadian Spitfire pilot, told us this afternoon the full story of last night's air "massacre." A formation of 12 Spitfires which he was leading on an armed reconnaissance bounced a squadron of 12 Focke-Wulf 190's and shot down ten of them without loss. It was the biggest bag gathered by any squadron in a single dog-fight since D-Day. And since the Battle of Britain, probably, has a Luftwaffe fighter formation of this size come so near to utter annihilation.

F.W.'s LIKE TRUCKS

It was all over in three minutes. Seven of the ten were shot down in 60 seconds. The battle will go down in air history as a copybook example of surprise, interception, and swift devastating attack. Never before has the superiority of the Spitfire IX over the F.W. 190 been so perfectly demonstrated. "The Focke-Wulfs did not get a look in" Brannagan told me. "Our Spits made rings round the Hun kites. Flying Spitfires in that little scrap was like driving jeeps into action against a formation of 15 cwt. trucks." Brannagan shot down two, bringing his score to six. Flying Officer William Myers, who, like his squadron leader, comes from Windsor, Ontario, bagged three. Five other pilots got one each. Brannagan told me his formation was returning from an uneventful patrol when he spotted the F.W.s flying in perfect formation, low down, near Laigle, some 60 miles south-east of Caen.

ONLY 2 LEFT

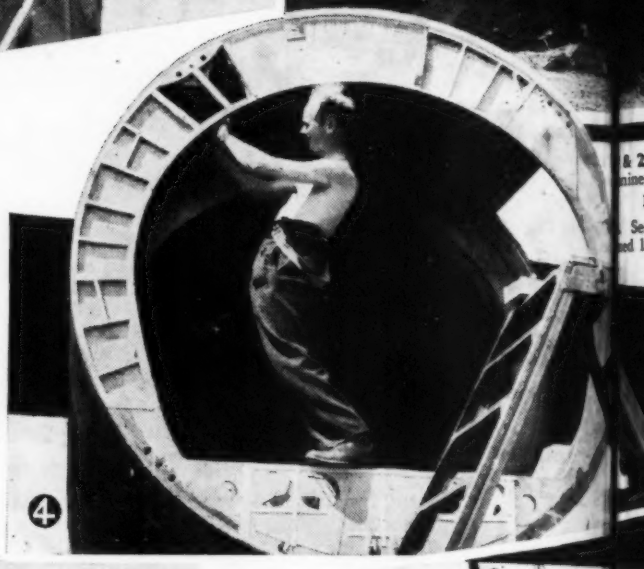
"Before attacking I wanted to make absolutely sure they weren't American Thunderbolts, which the F.W.s resemble. "We dived beneath them and held our fire until we were only 50 yards away. When I saw the black crosses I gave the order to shoot. It was all over inside three minutes. Seven went down in 60 seconds. Not until I and my No. 1 had each knocked down a Hun simultaneously in a two-seconds burst did Jerry know we were after him.

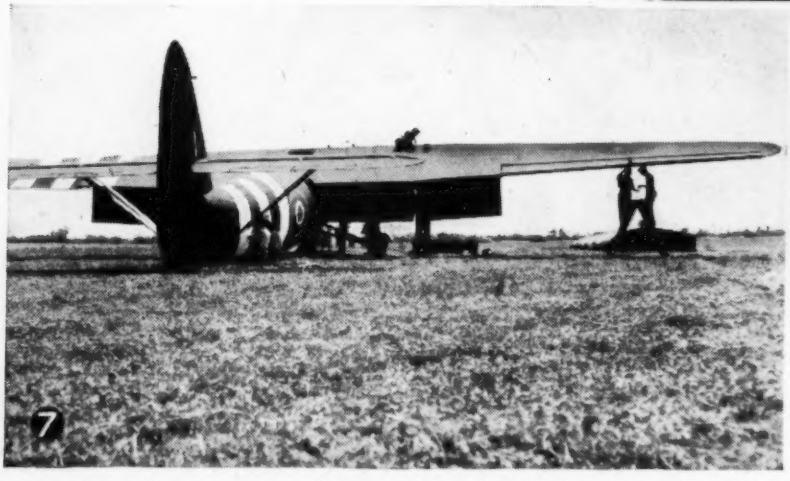
From THE DAILY MAIL *July 15, 1944*

Reclaiming "

Heavy Glider Servicing Unit at Work in Normandy

WHEN our glider-borne forces descended into the fields of Normandy on D-Day, a fair proportion of their Horsas suffered various degrees of damage. Semi-crash landings were not uncommon, and in consequence such things as wings and even fuselages got a trifle bent. But thanks to the interchangeability of components, it was obviously possible to rebuild a useful proportion of the Horsas employed from the undamaged and repairable parts which had survived the landings. For this purpose the Heavy Glider Servicing Unit was sent to France from Britain, and by patching up the slightly damaged ones and rebuilding others from usable components, reclaimed many of them.





7. The main components now duly assembled, the necessary adjustments are made to ailerons, flaps, etc.

"Day" Horsas

2. Officers of the Servicing Unit examine damaged gliders to decide what parts can usefully be salvaged.

3. Serviceable components are set aside and used later in rebuilding complete Horsas.

4. A member of the unit effecting repairs to a centre fuselage bulkhead.

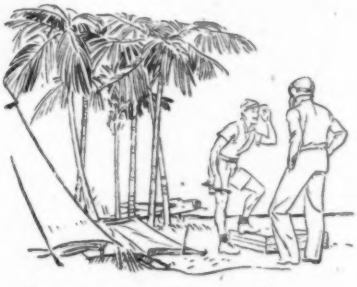
5. Replacing damaged stringers on an otherwise sound section of a fuselage.

6. A tail section, having been reconditioned, is offered up to a centre section in the course of assembly.

8. A rebuilt Horsa being towed to the dispersal point where the final adjustments and check-over will be made.

Haven't we met before?

"That's right, Sir! I serviced your machine at Lagos last February!"



The aim of Field Aircraft Service is easy to state—*world-wide service.* Not so easy to achieve of course, but we shall get there. In the post-war years, when airlines spread and extend to every corner of the globe (do globes have corners?) certainty of service will be just as important as speed, or comfort. More important we think; for proper servicing on the ground means security in the air. And on security, above all, progress in air transport will depend.

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Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

Killed

GOERING'S nephew, Lt. Helmut Goering, a *Luftwaffe* fighter pilot, is reported by the German News Agency to have been killed in an air battle over Normandy.

Retired

THE head of the General Staff of Mussolini's air force, Gen. Tessari, has been relieved of his post and placed on the retired list.

Decorated

NO. 564 on the list of members of German armed forces decorated with the Oak Leaves to the Knights' Cross Insignia of the Iron Cross is Gen. Eugen Meindl, commanding General of a parachute corps, whose award was announced a few days ago from the Fuehrer's H.Q.

Post-war Deal

A PATENT for an aircraft engine silencer held by Enrico Nizzoli, of Treviso, has been sold to Germany. The agreement, concluded last June, contains a clause providing for the payment of 30 million Italian lire six months after the end of the war.

B-29 Expected Research

"THE German High Command has been devoting much attention to the new American Boeing B-29," said the German News Agency.

It states:—

"Competent *Luftwaffe* departments have been in constant touch with Japanese military quarters, exchanging data and suggestions. Valuable knowledge regarding the defence against these super-bombers has thus been gathered."

Concluding on an optimistic note, the statement said that "if the super-forts now put in an appearance on the European theatre, the German Command would neither be caught unaware nor confronted with insuperable problems."

What They Say

"THE development towards totality is in fact our strongest and, because it cannot be imitated, our very own and unique weapon."

* * *

"When all our new weapons are fully employed, our enemy will find himself in a position which is like that of a man who owns the most modern attacking aircraft in the world, while his opponent simply congeals the air, or like that of an admiral without water for his fleet."

(*German Telegraph Service for Forces papers.*)

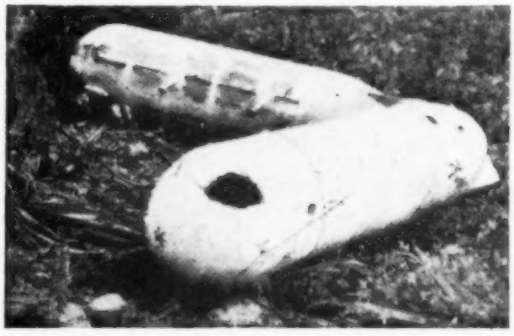
* * *

It is stated in an authoritative German quarter that new German weapons based on quite different principles are already in preparation so that *theoretically* it would be possible to make use of new weapons at once. But if we dealt out our trumps too soon, their effectiveness would be substantially diminished. In fact, it is theoretically possible that if we did that, then by the time they were due to deal their effective blow the enemy would have counter-weapons ready to use against them, thus reducing their striking power. The U-boat war taught us that the hour when a new method of attack goes into use is the hour of the birth of a new counter weapon. (*From an article in a German paper.*)

T.T.T.

"TEL til ti"—count up to ten—is the latest Norwegian slogan against the Germans. The underground press reports that TTT is the response of Norwegian workers drafted for the German armaments industry in Germany and in the occupied countries to Hitler's call for a super-total war effort.

Fritt Land, an underground paper, has asked prisoners somewhere in Norway why sabotage is so successful. They answer: "Tel til ti"—this is sabotage that cannot be seen or punished.



Long-range fuel tanks jettisoned by Japanese fighters or fighter-bombers in the Pacific area. They are made of wood and are very vulnerable to 0.5in. machine-gun bullets.

Raw Material Facts—

ALTHOUGH some time may elapse before the gap is actually felt, the loss of war materials sustained by Germany by the collapse of Rumania and the liberation of France is a severe blow to the German war industry and to her aircraft production in particular.

Rumania supplied one-third of Germany's total fuel oil needs and delivered annually about 25,000 tons of magnesium ore or 15 per cent. of total German supplies. France produced 800,000 tons of bauxite per annum and 15,000 tons of aluminium metal. In addition, even in 1943, the amount of steel produced in France amounted to 3,000,000 tons, and a considerable proportion of this was used by Germany. Perhaps less known but equally important is the fact that the French automotive industry supplied as much as 15 per cent. of German needs in cars and other vehicles.

To round off the picture, the loss of chromium from Turkey, wolfram from Spain, and the difficulties in getting supplies from Sweden are a serious predicament to the smooth progress of Dr. Goebbels' super-total mobilisation.

—and Propaganda

It is significant that the German News Agency saw it necessary to issue this reassuring statement pretending that everything is in order: "It is announced that the German heavy industries have at their disposal sufficient quantities of raw material for the manufacture of iron and steel products to cover the requirements of the armaments industry for a long time. Adequate supplies of ore are available, as well as of chromium, manganese, wolfram, and other steel alloys, so that the continued production of all kinds of steel is assured. The coal, coke, and foundries available are sufficient to allow for the increased production which will result from the employment of tremendous reserves of labour."

Moth and Gas

BOMB and work harassed *Hausfrauen*, of Essen, hurried last week to their wardrobes obediently following yet another ukas of the leaders to shake and dust their gas masks.

For the German authorities seem to be showing increasing interest in gas. Following the recent distribution of gas masks to different age groups of the civilian population, including babies, an Essen newspaper published instructions for their storage and protection. Gas masks kept in damp places—the instructions said—are inclined to become clogged. They should be kept in dry places, but not in wardrobes containing anti-moth powder as the filter sucks up the anti-moth gases and thus wears out.

Research

THE *Luftfahrt-Medizin* published the results of investigations conducted by several German scientists in the effects of sudden interruption of oxygen supply during parachute descents from high altitudes.

"In altitudes over 30,000 ft."—it is said—"only a little time elapses between the interruption of oxygen breathing and illness. During a descent the parachute, therefore, should not open before an altitude of about 18,000ft. is reached. Thanks to the counter-action of the air, resistance of which increases as the dropping body gathers speed, velocity of fall after a few seconds remains almost unchanged.

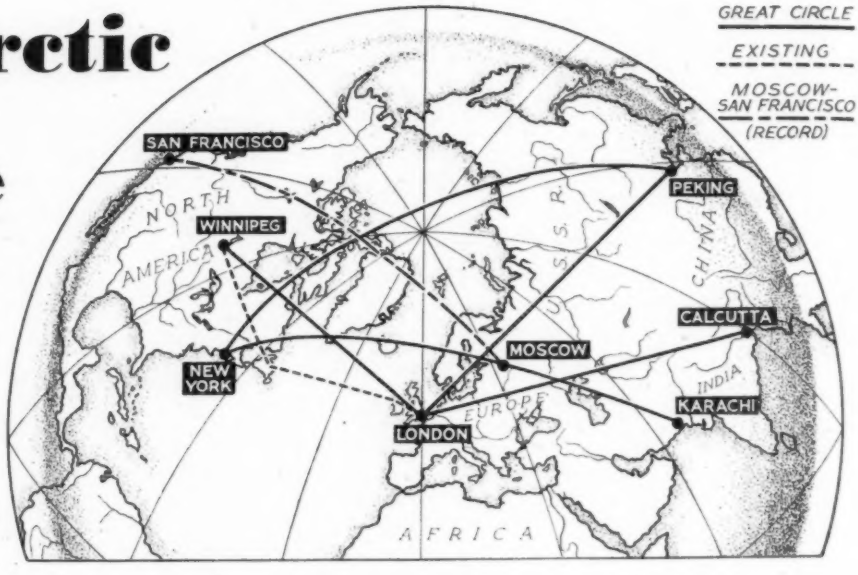
"Descending from between 30,000-33,000ft. with the parachute closed, a man will reach an altitude of 18,000ft. in approximately 16 sec. For this period the organism will stand up to the enormous speed of approximately 80 m. per second. With an open parachute, 18,000ft. is reached only after 7 min., during which period serious illness might develop. Hence—it is concluded—the period of descent must be reduced."

This is no new discovery!

The Arctic Air Route

Modern Technical Developments Have Changed Its Possibilities from an "Easy-stage" to a "Great-circle" Airway between Europe and America: Bases Already Established in Several Places

By JOHN GRIERSON



"The flying conditions of the Arctic are probably, on the average, as good as those of any other equally large area of the world. It follows, therefore, that the centre of the circle of civilisation, which is the Arctic, will be the flying crossroads of the world. This will necessitate the establishment of way stations here and there . . ."
Vilhjalmur Stefansson in the Encylopædia Britannica, 1929.

ON June 7th, 1576, Sir Martin Frobisher sailed from Deptford on a voyage which marked the beginning of 300 years' endeavour to discover a north-west passage to the Pacific and Cathay. To-day, in the light of our more complete knowledge of geography and the Arctic, it seems extraordinary that such persistence was shown in the efforts to find a short cut for shipping over the top of the world in the face of impassable icefields. But that persistence merely reflected the potential value which a short cut would have had, should it have been found to exist in reality.

Flying recognises no barriers of ice, however high or however deep. We can fly wherever we will, and almost whenever we will, thanks to the development of long-range aircraft and of navigational aids. Therefore it makes no odds whether the shortest distance between two places lies over the sands of the Sahara or the snows of the Arctic, aircraft can follow that course. Owing to the globular form of the earth, and to the fact that the greatest centres of population lie in the northern hemisphere, the shortest courses (or Great-circle routes) between many of the widely separated capitals lie over the Arctic. Hence the need for developing the Arctic as the aerial cross-roads of the world.

In 1924 the Americans, on their world flight in Douglas biplanes, were the first to pass by way of Iceland and Greenland. They went from Brough to Kirkwall (Orkney), thence to Hornafiord and Reykjavik (Iceland), and Frederikshaab and Ivigtut in Greenland, whence they made landfall on the American continent at Icy Tickle in Labrador.

In the same year an Italian called Locatelli attempted a similar flight in a Dornier twin-engined flying boat. He left Reykjavik at the same time as the Americans, but was forced down in the open sea near Cape Farewell on account of fog. Fortunately, three days later the American cruiser *Richmond* located the drifting Dornier, which could not take off on account of the heavy swell. The crew was rescued but the machine could not be taken in tow, so it was rammed and sunk to prevent it becoming a danger to navigation. Locatelli never made another attempt at transatlantic flying, and he met his end in Abyssinia a few years ago when he, with a group of other Italian air force officers, was surrounded and killed by Ethiopian patriots.

REMINISCENCES: Mr. Grierson swaps experiences with Herr and Frau von Grönau on board a Rhine steamer some years before the war

The British Arctic Air Route Expedition, which was the first serious attempt to examine the possibility of an air route over Greenland, set off for East Greenland in 1930 and remained there a year. Gino Watkins was the leader and the pilots were D'Aeth, W. E. Hampton, and Cozens. This expedition brought back valuable information concerning meteorological conditions, both on the coast and over the inland ice, but its scope was limited by the fact that the only flying equipment consisted of two Gipsy-Moth seaplanes. The Committee in London forbade an attempt to fly across the Ice Cap in these machines, and the large flying boat which had been promised for such a flight never materialised. Thus even in the Arctic, our civil aviation was handicapped by the Westminster theory that "Civil aviation

must fly by itself," and the half-hearted support from the British Arctic Air Route Expedition reduced its value enormously. Subsequently, the Air Ministry withdrew its patronage altogether, and a few of the members of the original expedition finished up in the pay of Pan American Airways, who employed them on further exploratory work in East Greenland.

In 1931 the German Wolfgang von Grönau, encouraged by the information brought back by the British Arctic Air Route Expedition, set off from Germany for Chicago. He flew a Dornier Wal fitted with two very unreliable B.M.W. engines of 700 h.p. each, the whole flight being organised and financed by the German Government. Von Grönau's route was by way of Trangisvaag (Faroes), Reykjavik, Scoresby Sound (E. Greenland), across the Ice Cap to Godthaab (W. Greenland), and landing in North America at Povungnetuk (Hudson's Bay). Von Grönau was the first man to fly across the Ice Cap. This feat he achieved by a hair's breadth, for he was flying in a full-throttle climb as he crossed the highest glaciers, and his wireless operator reported that the aerial was dragging in the snow. In later years, von Grönau's disagreement with Hitler, and the fact that he married a Jewess, made it convenient for him to be banished from Germany, and he was last heard of as military air attaché in Tokio.

Also in 1931, the American pilot Cramer made his second attempt to fly from America to Europe by the Arctic Air Route. His machine was a small cabin monoplane fitted with the Packard radial diesel engine of 200 h.p. He flew from Pangnirtung in East Baffin Land to Greenland, thence to Iceland, the Faroes and Shetland. Here he had trouble with his engine (which was really of an experimental type) and he and his mechanic could not effect more than makeshift repairs. They became impatient and set off for Copenhagen in the face of an adverse weather report. Their machine was forced down in the open sea and both men were drowned on the very last leg of their transatlantic flight.

The Italian Mass Flight

In 1933 the most spectacular flight along the Northern Route took place under the leadership of Italo Balbo. Twenty-four Savoia-Marchetti flying boats, each fitted with two 850 h.p. Isotta Fraschini engines, flew from Ortobello to Chicago via Amsterdam, Londonderry, Reykjavik, Julianehaab (Cape Farewell), Cartwright (Labrador), Shediac (New Brunswick), Montreal. During the same year, I set off from Brough in my old Gipsy-Moth *Rouge et Noir*, now equipped as a seaplane with Blackburn floats, and Marconi-Robinson homing wireless; extra petrol tanks gave a range of 900 miles at 75 m.p.h. My route was via

IN this article, especially written for Flight, *Mr. John Grierson, who has for more than ten years been an advocate of the Arctic Air Route, frankly admits that his original arguments were wrong. They were based on the northern route as an "easy-stage route." The author still thinks this has a great future, but in a different way—as a great-circle route between Europe and America.*

His views must be treated with respect for he knows the route from personal experience, having flown it in a Fox Moth seaplane in 1934.

Kirkwall (Orkney) and Thorshavn (Faroes) to Reykjavik, where engine trouble delayed me several weeks. Then, like Cramer, I became impatient and tried to take off for Greenland in a rough sea, with the result that I capsized in Reykjavik outer harbour and *Rouge et Noir* became temporarily a shipwreck. At this same time the Lindberghs, who were carrying out a survey of the Arctic Air Route for Pan American Airways, came into Reykjavik. Their base-ship was moored in the harbour, where mechanics went over and serviced the Lockheed floatplane. They had done a considerable amount of flying over Greenland, and after spending some days in Iceland, they went on to Copenhagen via the Faroe Islands.

By Fox Moth to Canada

In 1934 I set off for Ottawa and New York in a Fox Moth seaplane called *Robert Bruce*. My route from Rochester lay via Londonderry, Reykjavik, Angmagssalik (E. Greenland), Godthaab (W. Greenland), Lake Harbour (Baffin Island), and down the Hudson's Bay by Povungnetuk and Eastmaine to Ottawa. Again I had trouble in Iceland, though this time it was because the sea was too calm. In overshooting my take-off in the fiord, I collided with a rowing boat. However, a new wing was fitted and the float was repaired inside a few weeks so that I could continue on my way to East Greenland. Here, owing to rather inaccurate maps and to the jamming of my homing wireless, I was lost and forced to land in a fiord where eskimos found me eighteen hours later. Then the flight across the Ice Cap (which is between 9,000 and 10,000 feet high) was made, and the rest of the journey to Ottawa was completed more or less without incident. This was the first flight from England to Canada, and by way of celebration the petrol company repaid me the money I had spent in having my fuel depots laid down.

Between 1934 and the outbreak of war no further efforts were made to develop the Arctic Air Route, although several private flights were carried out by individuals who

FIRST OVER THE NORTHERN ROUTE: In 1924 the Americans made a world flight, crossing Iceland and Greenland en route. Here are their Douglas biplanes at Croydon.

THE ARCTIC AIR ROUTE

used Greenland and Iceland as convenient stepping stones for ferrying themselves and their machines across to Europe.

In reviewing the total exploratory work on the Arctic Air Route up to 1939, obviously the two most important contributions are those of the British Arctic Air Route Expedition and of Pan-American Airways by the Lindbergh survey flights. The comprehensiveness of the latter has not been generally realised, for the Lindberghs not only flew along the route as a whole, but made two crossings of the Greenland Ice Cap as well as flights around the coast. Thus even if the ill-advised, almost insane, excursion into politics of Charles Lindbergh may since have cast a slur upon his name, that survey of the Lindberghs must be remembered as one of the best ever made.

The Short-stage Conception

The primary motive underlying all these pre-war flights was to discover a transatlantic route which could be flown by easy stages. On the map it would seem possible to reach America by way of Iceland, Greenland and Labrador by hops of little more than 500 miles, an attractive proposition in the days when the still-air range of our commercial aircraft rarely exceeded 700 miles and there was no immediate prospect of flying 2,000 miles non-stop with a useful payload. I must confess that I personally was as much taken in by this prospect as was anyone else. There seemed to be so much to be gained by dividing the long route into easy stages—the increase of payload and the greater confidence of passengers who would never be called upon to endure more than three or four hours in the air at a stretch. But this entirely overlooks the climatic difficulties. On the east coast of Greenland gales of 120 m.p.h. may blow at any time except during the short summer; Cape Farewell is renowned for its storms; and the west coast has a well-founded reputation for fog. Iceland's south coast is well known to sailors for its fog and bad visibility, whilst the Reykjavik area is accustomed to 90 m.p.h. gales, even in summer.

Then there was the question of using landplanes or seaplanes, a question the answer to which was almost bound to be in favour of the latter, at any rate before the war. For there was no land airfield in the Faroes; in Iceland there was a 400-yard airfield at Reykjavik and a slightly larger field at Kaldadarnes; in Greenland there was absolutely nothing that looked like an airfield. Indeed, there seemed scope there for unbounded enthusiasm if anyone should have come along with a few ship-loads of high explosive and enough machinery to convert the local scenery into a landing place for aircraft. The same conditions, more or less, would have been applicable to the east coast of Labrador.

Seaplanes, which could use the existing harbours, would suffer a great disadvantage on this route on account of the freeze-up. This difficulty could be reduced by using large floatplanes in place of the more seaworthy flying boats, and fitting skis instead of floats for winter use. But whereas the Greenland seas freeze solid (though not in the flat even-surfaced form which many suppose) those surrounding Iceland do not. Therefore, apart from the obvious difficulties of freeze-up and thaw when for several weeks the ice is not strong enough to bear, there would be the problem of taking off from the sea in Iceland, and landing on the ice in Greenland. The feat of swopping from floats to skis in flight has yet to be mastered, and even the Canadians and Russians do not seem to have evolved a universal landing gear for water and ice. In the absence of such a technical accomplishment, the use of the Arctic Air Route becomes limited to the months of July, August and September when, in an average year, ice conditions for landing seaplanes are sufficiently favourable throughout the route. Moreover, even during this short period, enough bad weather may be encountered to stop a service from running for several days at a time.

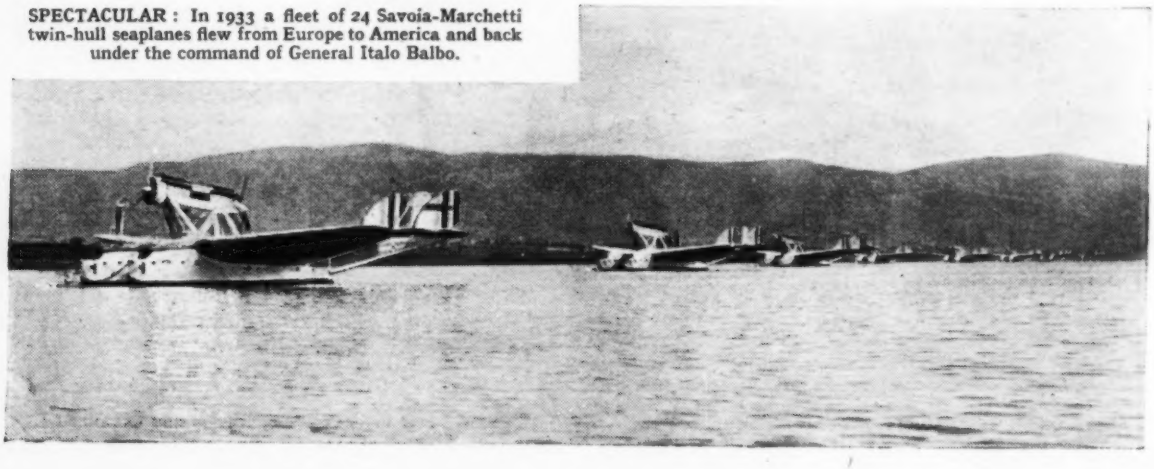
Therefore, in spite of all that I have said or written in the past, including a strong plea in "High Failure" for the establishment of just such an "easy stage" route as I have outlined above, I have no hesitation in saying, in the light of further developments, that the view was wrong. The factors principally affecting this change are, first, the successful development, before the war, of the Botwood-Foynes direct Atlantic crossing, and secondly, the very notable progress which has been made in extending the range of aircraft even since this war began.

Great-circle Routes

Does this mean, therefore, that the whole conception of an Arctic Air Route must be abandoned? On the contrary, there is good reason to suppose that, in another form, air routes over the Arctic should constitute the most important links between Europe and America after the war. This is because of the predominating fact, already mentioned, that the shortest distance, or Great-circle Route, between many of the important centres of population in Europe and America lies by way of the Arctic. The non-stop flight of the Russian airmen from Moscow to San Francisco by way of the North Pole demonstrated this, and it is a fact that the shortest routes between London and Central or Western North America would run through the Arctic. To follow such routes non-stop will require aircraft with ranges of 4,000-5,000 miles, which would have seemed impossible a few years ago. But now such an achievement is well within our grasp.

Vilhjalmur Stefansson's prophecy that the Arctic will become the flying cross-roads of the world is no idle speculation, for with long-range aircraft the need to make intermediate landings will disappear. All that will be necessary

SPECTACULAR: In 1933 a fleet of 24 Savoia-Marchetti twin-hull seaplanes flew from Europe to America and back under the command of General Italo Balbo.



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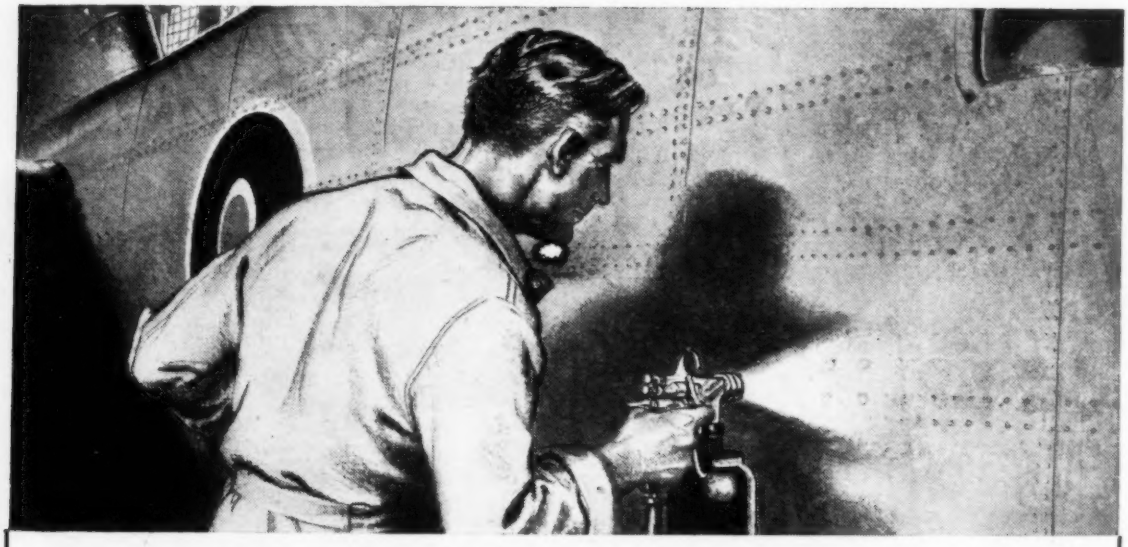

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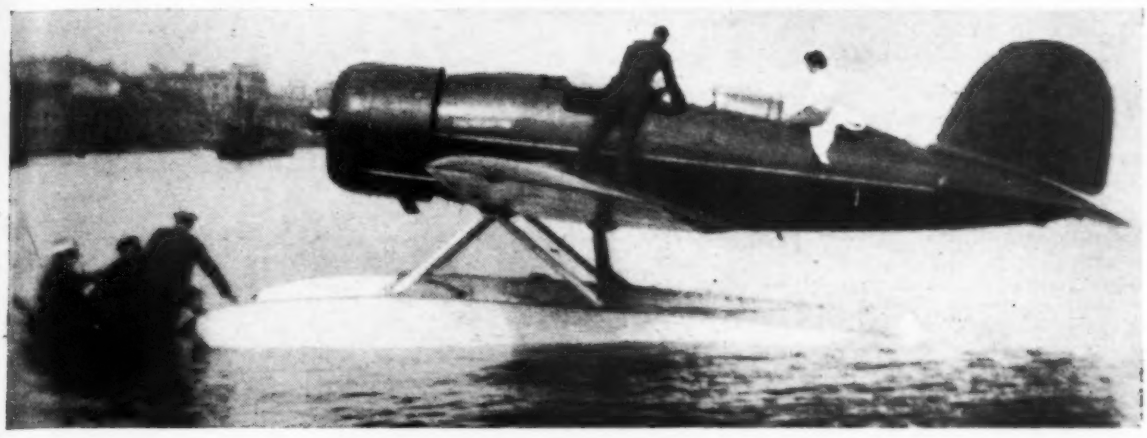


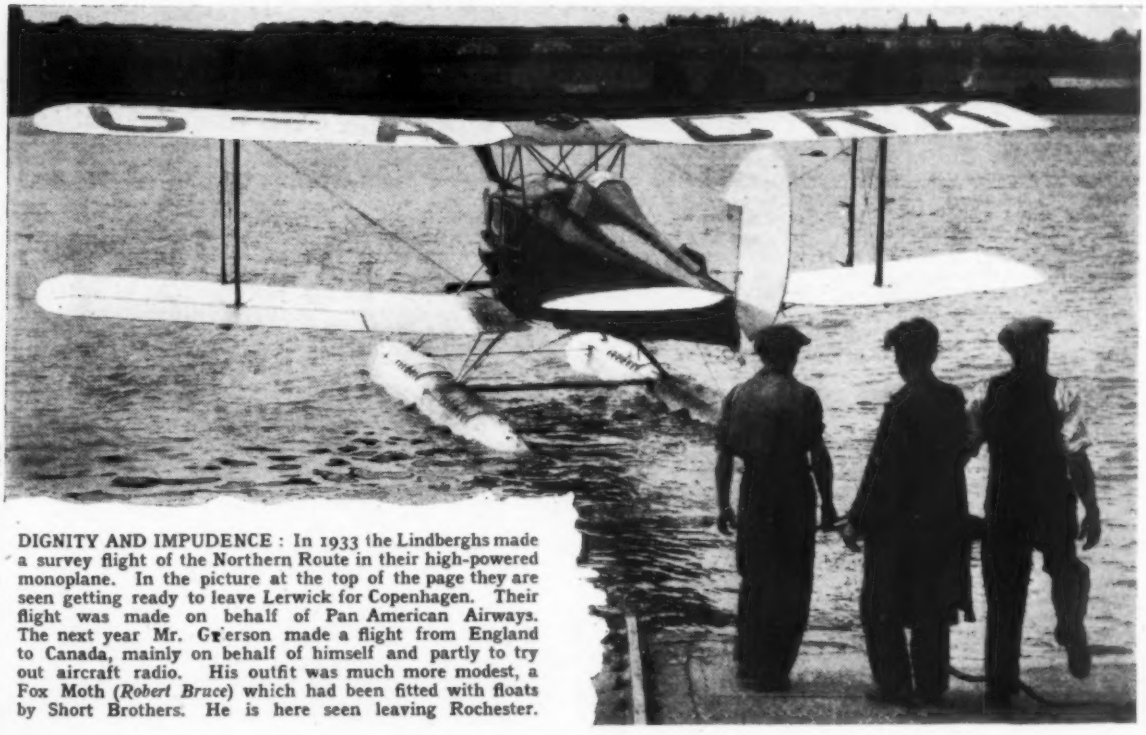
THE ARCTIC AIR ROUTE

will be a chain of wireless and meteorological stations together with two or three emergency bases equipped with aircraft which can be sent out like aerial lifeboats in the event of a forced landing. One of the few good things the war may have done is to develop facilities for the Arctic Air Route, since it is common knowledge that Allied air bases have been established both in Iceland and Greenland, which means that much flying will be done in the vicinity of those countries, and a valuable contribution will be made to such meteorological data as had hitherto been available. Money has been spent for war purposes to an extent which would have been impossible under our niggardly administration of civil flying.

So far as emergency bases are concerned, both Iceland and Greenland, especially the latter, suffer from violent winds of great turbulence. This is due to the proximity of glaciers to the coast. Air which has become chilled rushes down to the relatively warm sea at such a speed that it is impossible for a man to stand up. Baffin Land, which is the largest island in the Canadian Arctic Archipelago, and situated to the west of Greenland, appears to offer more favourable conditions for a base on account of its less mountainous nature.

The western part of this relatively unexplored land is flat; there are several large lakes which could be used for seaplanes, and with comparative ease an airfield for landplanes could be built. A regular shipping line to Churchill, in the Hudson's Bay, passes along the south coast, so that the only difficulty which the maintenance of supplies would entail would be in transporting them up country from a harbour on the south coast. This could be overcome by air transport, in the same way as armies have so often been supplied during the course of this war.

Therefore, the end of hostilities should see the Arctic Air Route almost ready for active operation between London and Winnipeg or any point on the west coast of America. The only major link which will require further investigation is Baffin Land, but plans are well in hand for



DIGNITY AND IMPUDENCE: In 1933 the Lindberghs made a survey flight of the Northern Route in their high-powered monoplane. In the picture at the top of the page they are seen getting ready to leave Lerwick for Copenhagen. Their flight was made on behalf of Pan American Airways. The next year Mr. Gr'erson made a flight from England to Canada, mainly on behalf of himself and partly to try out aircraft radio. His outfit was much more modest, a Fox Moth (*Robert Bruce*) which had been fitted with floats by Short Brothers. He is here seen leaving Rochester.

THE ARCTIC AIR ROUTE

an expedition to be made as soon after the war as conditions will allow. Then it should be possible to discover amongst the inland lakes the site for a major emergency base and meteorological station.

With the revival of civil aviation after the war, the technical developments achieved under the stress of combat, together with the virtual abolition of frontiers, should present us with opportunities the like of which have never before been known. If it is one of our war aims that we shall never, never again go back to the policy of muddle which made our civil air lines the laughing-stock of foreigners and a never-ending source of Parliamentary questions, then it should be one of our peace aims that we shall not miss those opportunities which peace will bring. Indeed, we are entitled to look forward to a Golden Age of civil aviation, in which the Arctic Air Route will play a leading part.

Mr. John Grierson being towed out of Angmagssalik, escorted by Greenlanders in their kayaks.

Defeat of the "V.1"

AFTER 80 days of more or less constant bombardment by Germany's air torpedoes—the much-vaunted "V.1" secret weapon—the fight against these ersatz heroes of the Third Reich has been won.

Last week Mr. Duncan Sandys, chairman of the War Cabinet Committee responsible for operational counter-measures against this particular menace, called a Press conference at the Ministry of Information under the chairmanship of Mr. Brendan Bracken, and announced that the Battle of London against the "flying bomb" was officially regarded as over, except for the possibility of a few parting shots. Although the actual launchings of the V.1 against the London area did not begin until the middle of June, the battle really began some 18 months ago when, in April, 1943, the first rather vague reports began to reach this country from secret agents in Germany that the enemy was developing a new kind of long-range bombardment weapon.

The value of these statements was at once investigated with the aid of the Intelligence branches of all three Services, and advice was sought from many of our leading scientists and engineers. As a result it was decided that the probable region for the development of such a weapon—if it really existed—would be on the Baltic coast, and reconnaissance aircraft were sent to photograph all the most likely areas. Among the photographs obtained was one that appeared to be a most unusual kind of experimental station at Pennemunde on an island in the Baltic. This puzzled the investigators at first, but on a subsequent photograph, close scrutiny by the interpreters disclosed that a blurred speck was a small plane sitting on what seemed to be an inclined ramp fitted with rails. Yet another picture showed black streaks on the earth which might have been scorch marks from a hot blast. From this and other information it was deduced that the object seen must have been a small pilotless, jet-propelled aircraft.

A Secret No Longer

At this time it was not known whether the machine was an offensive weapon of some new type of target plane—a development of the Queen Bee type, as it were. But all doubts were removed when it was discovered, in November last, that the Germans were building all along the coast from Calais to Cherbourg a whole series of concrete structures which had certain unmistakable features in common with those at Pennemunde. What was equally ominous was all these structures had their ramps pointing towards London.

Extensive air reconnaissance throughout the difficult winter months discovered 100 of these launching sites, and from December onwards they were incessantly attacked by the R.A.F. and U.S.A.A.F. until they were all destroyed. The Germans tried to repair them, but as they were repaired they were bombed again. Finally the enemy gave them up as a bad job and, in March last, set about construcing an entirely new series of sites of a much simpler kind and so well camouflaged that it was almost impossible to detect them by air photography until they had actually fired. But it was well into the summer before this new series of sites was completed and in the meantime our Intelligence services had found out so much about Hitler's "secret weapon" that we knew pretty well what to expect and so were able to set about the necessary counter-measures for the defence of London.

In January a defence plan had been drawn up, but it had to be flexible because we did not know which would happen first, the launching of our own invasion of Normandy or the launching of the first air torpedoes against London. Actually the V.1 attack began on D-day + 6 when our guns and balloons were already entensively sited around the British departure ports.

Prompt Action

But so complete were the preparations that, when the first "flying bomb" reached this country, a simple 'phone message put the pre-arranged plan into instant operation; balloons and guns were moved immediately to prepared sites on the south-east of London, and within 24 hours were taking toll of the enemy's latest missiles.

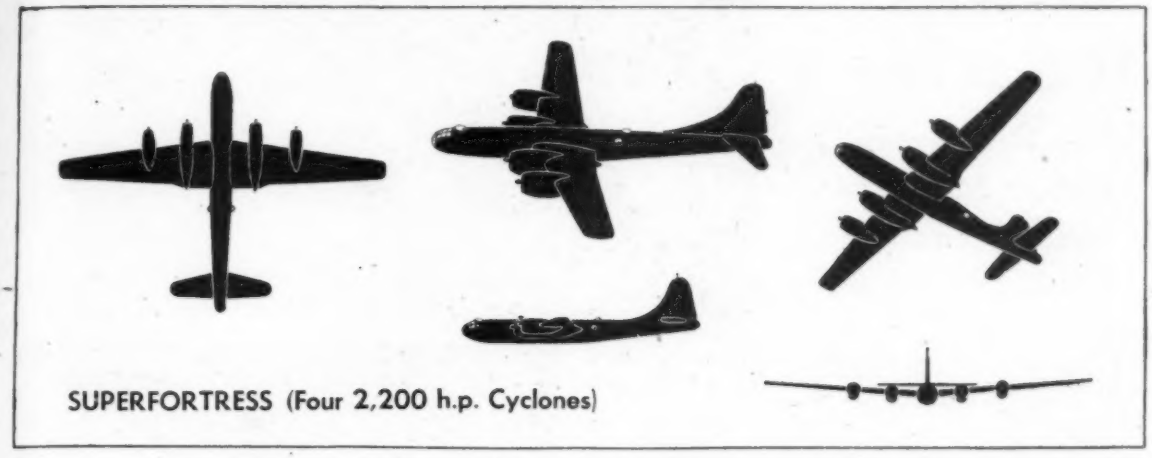
(This was officially known as the "Diver Plan," and the code message which put it into operation was "Diver, diver, diver.")

Briefly, the plan deployed the defences in three belts:—a fighter belt over the Channel and coastal region, then an A.A. gun belt, and thirdly a balloon belt as a last line of defence. There were, of course, a few difficulties to overcome. The bombs flew at very high speed and at an average height of 2,300ft., which was too low to get the best results from the heavy guns and a bit too high for the 40 mm. and 20 mm. light guns. Only our fastest fighters could catch them on level terms, and judging a dive from above them required some practice before the pilots could hit off the correct angle. Nevertheless during the first months some 40 per cent. of the bombs launched were brought down. As was to be expected, experience brought improvements both in defence tactics and in their execution. When it was found that the bombs consistently came in low, the number of balloons was increased from the original 500 to a final total of 2,000 with obvious results. A 24-hour standing patrol of fighters was maintained and a second fighter belt between the guns and the balloons was introduced, the guns being moved down to the coast to give them a clear field of fire. Various means were adopted for helping the fighter pilot to spot the missile in daylight. At night they were easily seen by their flaming tails but it was extremely difficult to judge the exact range. Then Prof. Sir Thomas Merton invented a simple and ingenious range-finder which proved to be the complete answer for the night-fighter pilot, yet the device cost the ridiculously small sum of 1s. to produce.

Of the 8,000 air torpedoes launched, only 2,300 reached the London area, the record bag being on Aug. 28th, when 97 out of 101 were destroyed.

Studies in Recognition

Aircraft in Flying Attitudes



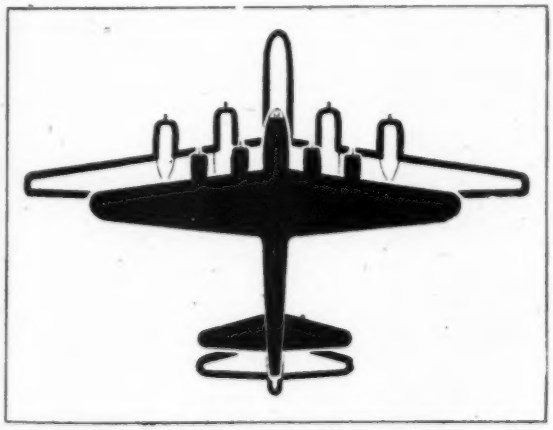
SUPERFORTRESS (Four 2,200 h.p. Cyclones)

WHEN the Germans have finally been put back where they belong—a job now rapidly nearing completion—there will remain the task of similarly disposing of the Japanese. Just how long this will take nobody knows at the moment, but it is beyond all doubt that strategic bombing of Nippon's war factories will form a vital phase of the undertaking.

Hitting the enemy where it hurts most means hitting him in his own lair. The Jap probably felt safe from this form of retribution when he launched his attack against America. At that time there were no bombers with sufficient range to carry heavy bomb loads from any Allied-held territory and tip them out over the Japanese homeland. Vladivostock was about the nearest point from which an attack was physically possible, but Russia and Japan were not at war. The assault on Pearl Harbour aimed at, among other things, making it impossible for the U.S. to carry out a sea-borne attack of any kind, but it failed, and in due course General James Doolittle (then Colonel) startled the world by leading the first bombing raid on Japan with carrier-borne Mitchells. It was the first time twin-engined medium bombers had ever been launched from a "flat-top," and must have shaken the Japs' self-confidence considerably, even though the weight of bombs dropped was comparatively small.

But this gallant attack was probably intended mainly to show the Jap he was not as safe as he had thought; something far heavier than sea-borne aircraft were required for a serious onslaught against their war potential at its source, and thus the Boeing B-29 Superfortress eventually came into being. Already squadrons of this very long-range heavy bomber have raided the Japanese home islands from bases in China, and as the Allied sea and land forces steadily occupy islands nearer and nearer, the Land of the Rising Sun sees its sunset and black-out steadily approaching.

Boeing B-29 Superfortress Bomber.



This silhouette of the B-17 Flying Fortress superimposed on the outline of a B-29 Superfortress gives a clear impression of the comparative sizes of the two bombers. Note the very long nose of the B-29, and relatively smaller tailplane.

In general outline the Superfortress, as one would naturally expect, resembles the B-17 Flying Fortress fairly closely. The chief difference between the two lies in their respective sizes, and the extent of this dimensional difference is clearly illustrated by the accompanying sketch in which a silhouette of the B-17 is superimposed on an outline of the B-29. But, quite apart from its size (which from the ground recognition point of view involves a fairly accurate estimate of altitude), there are a number of features which distinguish the two types in spite of their general similarity.

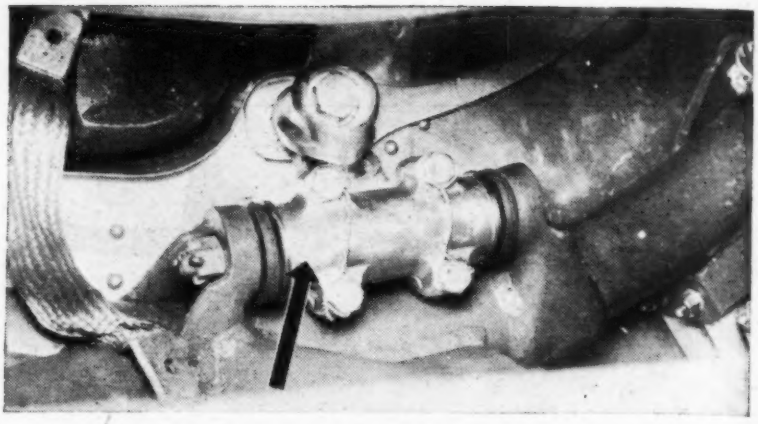
First and foremost the wings of the B-29 are in the mid-wing position whereas the B-17 is a low-wing arrangement. In plan form the B-29's wings are of appreciably higher aspect-ratio and taper to square tips instead of rounded tips. Secondly, there is an important difference in the fuselage of the B-29 which—ignoring the excrescences of gun-turrets, etc.—preserves a straight top line from the nose to the fin; the B-17 on the other hand has a raised cabin-top above the main fuselage structure. The nose section of the B-29 is also very much longer in proportion to the aircraft's total length than is that of the B-17.

Finally, the dorsal fin of the B-29's vertical tail surfaces does not stretch as far forward as does that of the B-17. The former merges into the fuselage well aft of the trailing edge whereas in the case of the B-17 it ends almost directly above the trailing edge roots. Tailplanes, it will be noticed, are practically identical, so that the B-29 appears to have a very much smaller one in relation to wing-span.

Powered by four 2,200 h.p. 18-cylinder Wright Cyclones, the B-29's top speed is well over 300 m.p.h., and, with a fuselage divided into pressurised compartments, it can operate at more than 30,000 feet. Dimensions: Span 141ft. 3in., length 90ft., height 27ft., wing area 1,739 sq. ft.

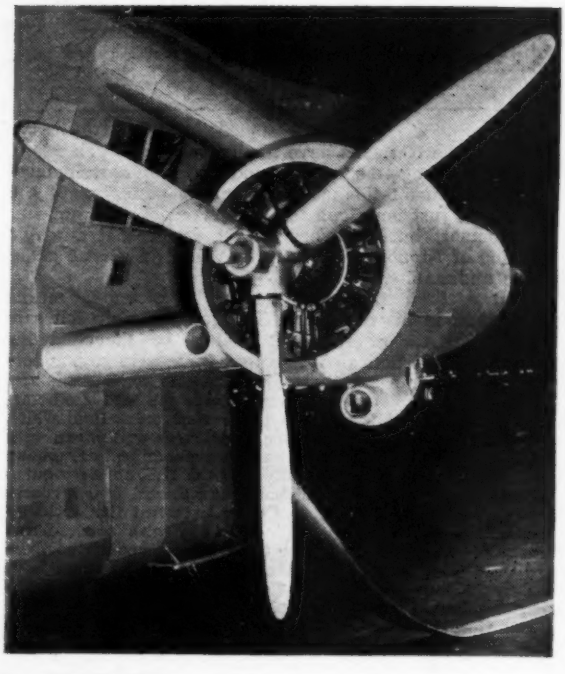
Floating on Rubber

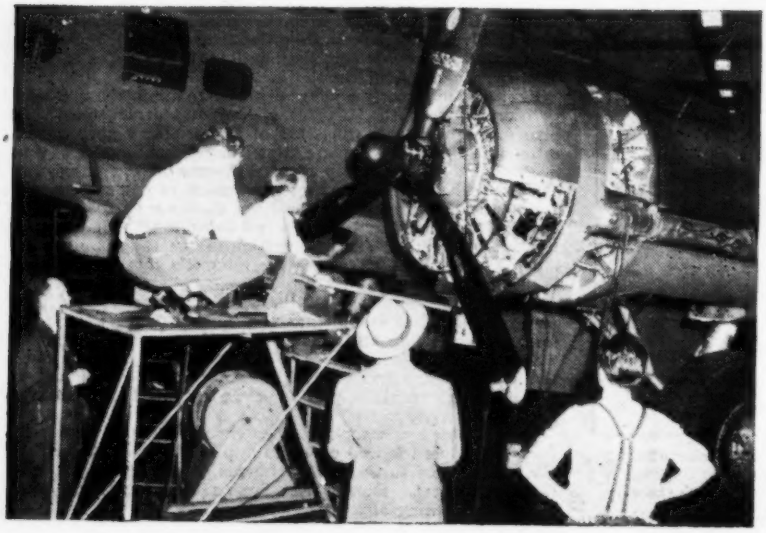
The New Goodyear Engine Mounting : First Application to Flying Fortresses



THERE is, of course, nothing new in the use of rubber mountings for aircraft engines, but the Goodyear company of Akron, Ohio, has brought out a type of mounting which is claimed to represent an advance on any previously used. Goodyear research scientists made a very thorough mathematical analysis of the causes of vibration before attempting to devise means for meeting them. There are many unbalanced forces in an engine which cause vibrations, and which cannot be eliminated, but which *can* be absorbed so that the vibrations are not transferred to the supporting structure.

For the first development the mounting ring of a Fortress engine was chosen. The radial engine offers special problems because it is mounted from a ring at the back, and thus the mass has to be supported a considerable distance behind the centre of gravity. A number of the Goodyear rubber mounts are used for attaching the engine to the tubular mounting ring. Each mount consists of two main parts. There is a collar lined with a rubber bush. This collar is attached to lugs welded to the ring. It has a socket which is at right angles to the collar itself. The other half of the mount, a small unit attached to the engine, terminates in a ball which fits into this socket. Vibrations are isolated by the ball-and-socket joint and by the rubber bushing in the collar. The bushing is of special design, and the whole mount gives freedom of motion for every mode of vibration that can occur. It permits limited rotation around the crankshaft and about the axes at right angles to the crankshaft, as well as linear motion at right angles to the crankshaft.





The Goodyear rubber mounting shown at the top of the page comprises a rubber-bushed collar and a ball-and-socket joint. On the left the engine, complete with a number of these rubber mounts, has been installed in a Fortress.

The picture above shows one of the engines of the Goodyear Navy airship M-1 to which Lord Ventry referred in his article last week. The airscrew is a Curtiss electric in which the pitch can be reversed so as to use the airscrew as an air brake. This is particularly useful when approaching a mooring mast. Apart from its use for checking speed, the variable-pitch airscrew enables a saving of fuel to be made, since the pitch can be set to give best efficiency at all speeds. At take-off the low-pitch setting gives maximum thrust and increases the weight at which the airship can get off by adding dynamic lift to the static lift of the gas.

Anti-Submarine V.C.

The KING has been graciously pleased to confer the VICTORIA CROSS on Flying Officer John Alexander Cruickshank, R.A.F.V.R., No. 210 Squadron, in recognition of most conspicuous bravery. The official citation reads:—

THIS officer was the captain and pilot of a Catalina flying boat which was recently engaged on an anti-submarine patrol over northern waters. When a U-boat was sighted on the surface, F/O. Cruickshank at once turned to the attack. In the face of fierce anti-aircraft fire he manœuvred into position and ran in to release his depth charges. Unfortunately, they failed to drop.

F/O. John A. Cruickshank

F/O. Cruickshank knew that the failure of this attack had deprived him of the advantage of surprise and that his aircraft offered a good target to the enemy's determined and now heartened gunners.

Without hesitation, he climbed and turned to come in again. The Catalina was met by intense and accurate fire and was repeatedly hit. The navigator/bomb-aimer was killed. The second pilot and two other members of the crew were injured. F/O. Cruickshank was struck in seventy-two places, receiving two serious wounds in the lungs and ten penetrating wounds in the lower limbs. His aircraft was badly damaged and filled with the fumes of exploding shells. But he did not falter. He pressed home his attack, and released the depth charges himself, straddling the submarine perfectly. The U-boat was sunk.

He then collapsed and the second pilot took over the controls. He recovered shortly afterwards and, though bleeding profusely, insisted on resuming command and retaining it until he was satisfied that the damaged aircraft was under control, that a course had been set for base and that all the necessary signals had been sent. Only then would he consent to receive medical aid and have his wounds attended to. He refused morphia in case it might prevent him from carrying on.

During the next five and a half hours of the return flight he several times lapsed into unconsciousness owing to loss of blood. When he came to, his first thought on each occasion was for the safety of his aircraft and crew. The damaged aircraft eventually reached base, but it was clear that an immediate landing would be a hazardous task for the wounded and less experienced second pilot. Although able to breathe only with the greatest difficulty, F/O. Cruickshank insisted on being carried forward and propped up in the second pilot's seat. For a full hour, in spite of his agony and ever-increasing weakness, he gave orders as necessary, refusing to allow the aircraft to be brought down until the conditions of light and sea made this possible without undue risk.

With his assistance the aircraft was safely landed on the water. He then directed the taxying and beaching of the aircraft so that it could easily be salvaged. When the medical officer went on board, F/O. Cruickshank collapsed and he had to be given a blood transfusion before he could be removed to hospital.

By pressing home the second attack in his gravely wounded condition and continuing his exertions on the return journey with his strength failing all the time, he seriously prejudiced his chance of survival even if the aircraft safely reached its base. Throughout, he set an example of determination, fortitude and devotion to duty in keeping with the highest traditions.

R.A.F. OWLS

"THE eyes of the Army after dark"—the Baltimores and the Bostons of the Desert Air Force—have been operating on an intensive scale most nights since Allied troops landed in Southern France.

These Baltimores and Bostons—"The Owls of the R.A.F."—have been very busily employed on their armed reconnaissances over the Fifth and Eighth Army fronts, and in front of the Polish Corps, for months. Now the same job over the Allied front in Southern France is added, but there is no let up in the "stooges" over Italy. Ranging far inland in France, the crews bring back information of the highest importance to the Army.

A Baltimore squadron and a Boston squadron can claim to have struck the first Allied blow against the Boche on the Riviera on D-Day itself. They were over the landing areas early in the morning, and had a good "look-see" at the famous holiday resorts, which a few hours later were to see the landing of the Allied airborne troops. Actually, the Bostons and the Baltimores were there only about an hour before the paratroopers jumped.

One Baltimore squadron, which has always had an inter-Allied flavour, includes in its crews airmen who formerly belonged to the Royal Yugoslav Air Force, and who escaped to carry on the fight by means that put many thrillers in the shade, for sheer excitement.

South Africans, Canadians, Australians, New Zealanders, are all represented in these Baltimore and Boston crews, and the wing is commanded by a South African in the R.A.F.—Group Captain Jack Fendick Roulston, D.S.O., D.F.C., a native of Winburg, Orange Free State, who formerly served in, and later commanded, a squadron in the wing he now controls.

One of the Boston squadrons, commanded until recently by another South African, Maj. Gordon, D.F.C., is now under Sqn. Ldr. Arthur Passmore, D.F.C., Greek D.F.C., of Rochester, Kent, who just over two years ago escaped from Java to Australia in an open boat—a trip which took 48 days.

One of the Baltimore squadrons is under Wing Cdr. James Wallace, D.F.C., of Limerick, Eire, who has been engaged in the air war in the Middle East and Italy since he left Nairobi for the Sudan.

Air Marshal Sir Arthur Coningham once wrote of the Bostons that they "create merry hell behind the enemy lines, and cause loss and disruption to the enemy out of all proportion to the size of the forces engaged."

Wing Cdr. Lionel Leon, D.F.C., a South African from Johannesburg, who commands one of the Baltimore units, said: "Our prey is anything we can see on the roads. At the same time, we are collecting all the information possible about the German movements."

An army liaison officer attached to the Bostons said: "The intelligence those aircrews bring back is of enormous importance to the Army," while the C.O. of a Boston squadron put it this way: "The aim is to give as much trouble as possible in these night stooges, and by this means upset the German time-tables. As a result, the German troops arrive late or their rations are delayed. All these factors have a vital effect on the battle."

A.T.C. CADETS IN R.A.A.F.

SINCE the Air Training Corps was formed three years ago, 8,661 members have enlisted in the R.A.A.F. Of these 5,383 are air crew, 2,993 are technical ground staff and 285 are in various other branches of the Air Force.

The Australian Minister for Air (Mr. Drakeford) revealed recently that 950 former cadets were now on operations with the R.A.A.F. or had reached the operational stage, having completed their training. There were 12,969 air cadets at present in training in the 100 A.T.C. squadrons throughout Australia. Nearly 9,000 were enrolled cadets, who had passed their preliminary tests and were now in uniform.

Mr. Drakeford said that one A.T.C. graduate, F/O. F. H. Bunce, of Sydney, who won a D.F.C. in April, had so far been decorated, and now that numbers were getting into operations it was likely that many more would distinguish themselves in action.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

PLASTICS FOR AIRCRAFT ENGINEERS

Co-operation with the Moulder

MR. NICHOLS, in his article on plastics in your August 24th issue, fails to make one very important point. This is that as aircraft engineers cannot hope to be experts in the moulding of plastics, there must be active co-operation between the aircraft engineer and the moulder in the very early stages of design if full use is to be made of the materials available and if full advantage is to be taken of the moulder's skill and ingenuity.

In many designs there are two possible positions for the "parting line"; it is obviously the moulder who should decide which should be used, and before this decision is made there are many points in the detail design which cannot be finalised. It is again the moulder who must state what tolerances he can maintain on important dimensions and thus if a machining allowance should be left or not.

These two points serve to show the very definite need for co-operation at the earliest possible stage in design, and it might be as well to add that these points apply equally to die-casting, gravity die-casting (permanent mould casting), and also to pressure die-casting (die-casting).

A. G. SHOVE.

CIVIL AIRCRAFT ENGINES

Overhaul Life the Main Factor

MR. POLLITTS' reply to my article on civil aircraft engines seems to be mainly concerned in making out a good case for the liquid-cooled engine, as though I had made this my chief topic. I have certainly given my views on the post-war possibilities of air- and liquid-cooled engines, and have also given the reasons for these opinions. However, the main point of my article was to emphasise the importance of the overhaul-life figure for both power unit and power plant. Taking into consideration every aspect of the aircraft engine position in 1939, and after five years of war during which phenomenal advances have been made both in the development of aircraft and engines, I am more than ever firmly convinced that, until some other form of power unit replaces the reciprocating power unit, the air-cooled (chiefly the air-cooled radial) engine will take the lead in the large-type civil aircraft.

By large aircraft I mean one having approximately a total normal rated power of 6,000 h.p., an overhaul life of not less than 750 hours, and a power-loading of approximately 10 lb. per h.p. I do not see how the British air-cooled radial engine can possibly be on a level with immediate events of post-war years; that is why I have referred to the liquid-cooled engine as being a stop-gap. No one would dispute the fact that the Merlin engine has achieved more than any engine in the world. It has been pushed to the limit in order to meet military requirements, and high-altitude performance has been achieved at almost any expense, even to reliability for a given period.

I am not sure how to interpret the remarks Mr. Pollitt has made concerning the Douglas DC_4 and the Merlin engine. I cannot see the significance of this any more than installing the Merlin in the Beaufighter. Surely this can be only a means of obtaining data, and not a commercial sales proposition. For civil purposes, assuming a maximum figure for overhaul life of 750 hours, a very useful guide for a reliable engine is its total swept volume.

For instance, if we take the latest figures for the engines now in production, it is reasonable to assume that a reliable engine should be capable of producing a maximum of 43 h.p. per litre and approximately 120 h.p. per cylinder. The figures given in the appended list, therefore, indicate that the Merlin engine of 27 litres is too small for large civil types of aircraft; the Hercules of 38.7 litres is much nearer the mark.

On this basis I still maintain that compactness, accessibility, maintenance cost, and the form of cooling system are all of secondary importance to reliability, or, in other words, overhaul life. As Mr. Pollitt has remarked, it is a bold assertion that the liquid-cooled V-type engine will be subsequently discarded in favour of other types.

As you will see, I have based this assumption on the above-mentioned figures, and therefore it may be some time before even the Merlin will be discarded, in spite of its small capacity. The reason for this is that there is no British engine of the right capacity that has yet reached the overhaul-life figure of 750 hours, and this includes the British air-cooled radial. You may ask why 750 hours has been chosen, and the answer is that it is based on a rough average which the American air-cooled radial (poppett valve) has already achieved.

Finally, I am not at all confused (as Mr. Pollitt suggests) concerning the application of a purely military power-plant to the York, but I am, shall I say, suspicious to find no evidence that the purely military power-plant with the British air-cooled radial engine has been tested in the York. Surely this opportunity presented itself when the Lancaster was converted. This was the right opportunity, and I suggest that if this country continues to miss right opportunities, then the right type of second-to-none engine will be a long time coming.

C. H. POTTS, Sqn. Ldr. R.A.F. (Ret.).

CAPACITY AND POWER OF AIRCRAFT ENGINES

Engine.	Power.	Capacity.	H.p. per Litre.	H.p. per Cylinder.
Wright	2,200	54.9	40	122
Wright	1,700	42.7	39.6	121
B.M.W.	1,650	41.9	39.5	118
Hercules	1,650	38.7	42.6	118
Sabre	2,200	36.7	60	91.6
Cyclone	1,200	29.9	40	133
Merlin	1,650	27	61	137.5

POST-WAR OWNER-PILOTS

Analogous to Private Motorists?

I THINK it is about time that all the talk about a "post-war aerocar" for the private owner was viewed in a saner light. If people think that there will be air travel after the war, as there is automobile travel now, either they will be sadly disillusioned, or there will be a very reckless Government in power to allow it. Automobiles are supposed to keep to a prescribed path, are extremely controllable at all speeds, and are limited to 30 m.p.h. in built-up areas. Yet they take a fearsome toll of life on the roads.

I shudder at the picture of millions of small aircraft whizzing around the skies of Britain in the hands of unairworthy "air-hogs" and most probably unairworthy aircraft. There is no foolproof aircraft. Even the helicopter requires a cool, skilful pilot. Remember the mobile junk heaps that were flogged along the roads of Britain before the war, and often by irresponsible youngsters at the "mad" age? Imagine the air analogy: lunatics in ancient "Austers" or "Tigers" showing off to the locals. No house in the country would be safe. Even worse is the horrible vision of your Uncle Ted returning home one night, far from sober, in his reconditioned six-seater "Stuka," or Aunty Mary steering along a "heavy-traffic" lane, powder puff in hand!

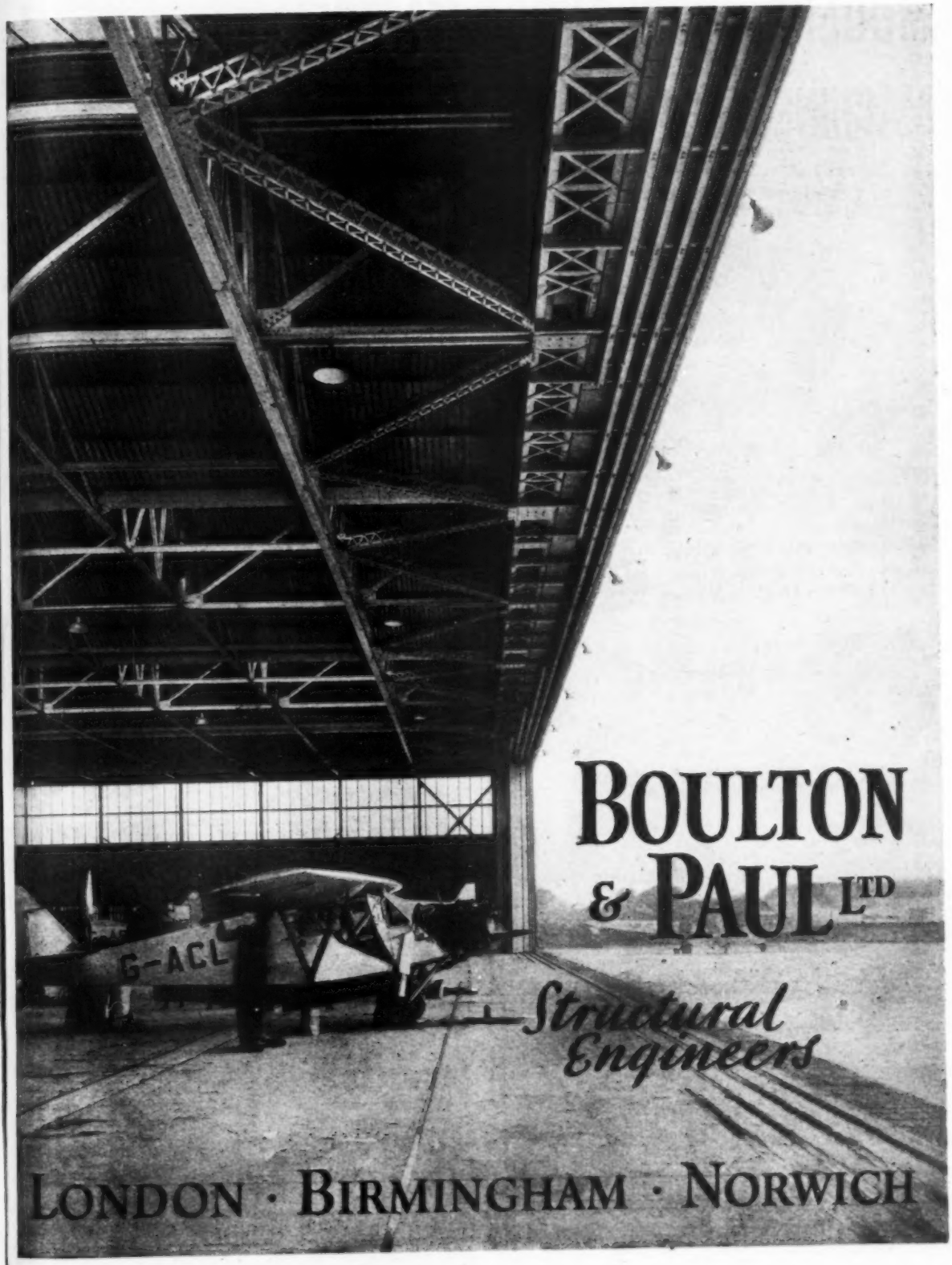
To fly in comparative safety, the strictest discipline must be enforced on pilots, and the pilots must be amenable to this discipline. Air discipline is responsible for the few fatalities in training. If it were not for the rigid rules, many aspiring Johnny Zero's would never live beyond the I.F.T. stage. But discipline cannot be forced upon civilians. At least, not the people who "cut-in" in traffic, driving red M.G.s with a load of girls in the back. Or the gents who used to dominate the road in huge Buicks.

And will these amateur aviators carry out D.I.s and "Majors" conscientiously and with complete disregard for their pockets? I can easily visualise soldered longerons and patched "props" in "good running order." Show me the genius who is pilot-cum-rigger-fitter! and, pray, how long is his expectation of life after dismantling his own "Claudel-Hobson" carb.? What is more important, how many innocent victims will all these menaces take to Valhalla with them?

Of course, there will be civil flying after the war. Over the moors and downs, I hope, and under strict Government supervision, both man and machine—with the threat of ten years penal servitude for loss of life through negligence or insobriety.

The recognised airlines should find no difficulty in supplying Britain's air-travel needs, with their usual fine record of extremely few fatalities.

"DECK-HOOK"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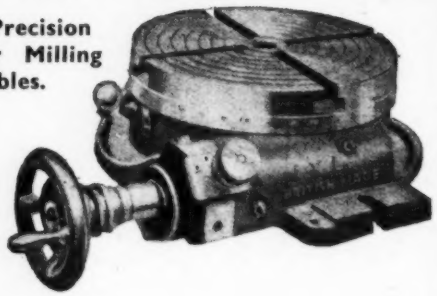
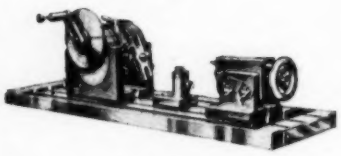
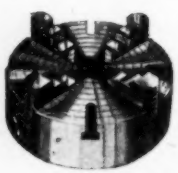




Dividing Heads.

Swivel Base Machine Vices.
Swivel Jaw Machine Vices.
Taylor Pattern Machine Vices.



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SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards for courage, skill and devotion to duty while operating from, or serving in, H.M. ships *Furious* and *Victorious* during many successful strikes at enemy shipping off the coast of Norway:—

Bar to Distinguished Service Cross

Act. Lt. Cdr. (A) W. H. MARTYN, D.S.C., R.N.

Distinguished Service Cross

Temp. Lt. (A) D. S. MILLER, R.N.V.R.
Temp. Sub. Lt. (A) H. ASHFORD, R.N.V.R.
Temp. Sub. Lt. (A) I. G. W. ROBERTSON, R.N.V.R.

Mention in Despatches

Lt. G. C. YORKE, R.N.
Lt. (E) H. R. M. S. FERGUSON, R.N.
Temp. Lt. (A) C. G. HURST, D.S.C., R.N.V.R.
Temp. Lt. (A) L. W. PECK, R.N.V.R.
Temp. Lt. (A) G. RUSSELL-JONES, D.S.C., R.N.V.R.
Temp. Sub. Lt. (A) A. E. BROWSE, R.N.V.R.
Temp. Sub. Lt. (A) G. J. BURFORD, R.N.V.R.
Temp. Sub. Lt. (A) D. H. COLLETT, R.N.V.R.
Temp. Sub. Lt. (A) L. D. DURNO, R.N.V.R.
Temp. Sub. Lt. (A) J. C. FAIRCLOUGH, R.N.V.R.
Temp. Sub. Lt. (A) J. M. McCORMICK, R.N.V.R.
Temp. Sub. Lt. (A) H. W. PETHICK, R.N.V.R.
Temp. Sub. Lt. (A) J. WATSON, R.N.V.R.
Temp. Sub. Lt. (A) G. A. RAWSTRON, R.N.Z.N.V.R.
Temp. Sub. Lt. (A) M. RIVETT, R.N.Z.N.V.R.
Temp. Sub. Lt. (A) D. E. ROWE, R.N.Z.N.V.R.
Air Art.3 F. T. KYZER.
Act. P.O. Airman A. H. KIMBERLEY.
Act. P.O. Air Mech. J. H. A. DAUGHTERS.
L/S. A. ROACH.
L/A. J. COULBY.
L/A. H. E. HOYTE.
Act. L/A. V. SMYTH.
Act. L/A. T. SPENCER.
L/A.F. E. J. J. MAYNARD.
L/A.F. E. G. WEEKS.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

Second Bar to Distinguished Service Order

Act. Wing Cdr. J. E. JOHNSON, D.S.O., D.F.C., R.A.F.V.R.—Since being awarded a Bar to the Distinguished Service Order, this officer has led large formations of aircraft in many and varied sorties. During these operations 34 enemy aircraft have been destroyed, several of them by Wing Cdr. Johnson himself. He is a magnificent leader, whose unsurpassed skill and personal courage have inspired all. Wing Cdr. Johnson has destroyed at least 28 hostile aircraft.

Bar to Distinguished Service Order

Act. Wing Cdr. L. A. LYNN, D.S.O., D.F.C., R.A.F.O.—Wing Cdr. Lynn has completed a large number of day and night sorties, during which he has successfully attacked a wide range of strongly defended targets. He has maintained a high standard of operational flying, and his genius for leadership has been outstanding. His achievements have won great praise.

Distinguished Service Order

Act. Wing Cdr. P. J. SIMPSON, D.F.C., R.A.F.O.—Since being awarded the D.F.C., on the completion of his first tour of operational duty, Wing Cdr. Simpson has commanded two squadrons and taken part in a large number of operational sorties. From September to December, 1943, he led his wing on a series of patrols which accounted for the destruction of at least eight enemy aircraft. He was then posted to another Wing, which he led for four months without the loss of a single aircraft. Since the invasion of France this officer has continued to display a fine fighting spirit, and under his courageous leadership the Wing has destroyed at least 16 enemy aircraft and damaged many others.

Act. Wing Cdr. P. J. Simpson, D.F.C., who has been awarded the D.S.O. The official citation appears on this page.

Act. Sqn. Ldr. R. A. KIPP, D.F.C., R.C.A.F., No. 418 (R.C.A.F.) Sqn.—This officer continues to display the highest standard of skill and gallantry in air operations. He has completed very many sorties and his careful planning, tactical ability and iron determination have brought him much success. In April, 1944, he led a section of aircraft on a sortie over enemy territory during which four enemy aircraft were shot down, two of them by Sqn. Ldr. Kipp. On another occasion one night in May, 1944, Sqn. Ldr. Kipp destroyed four hostile aircraft in combat. His genius for leadership has always been apparent, and his example has been most inspiring.

Wing Cdr. C. St. G. W. CHAPMAN, R.C.A.F., No. 162 Sqn.—This officer has completed a large number of sorties and has displayed a high degree of skill, courage and devotion to duty, qualities which were well in evidence on a recent occasion when he successfully attacked a U-boat. In the fight his aircraft was struck by anti-aircraft fire and extensively damaged. Height was rapidly lost but Wing Cdr. Chapman skilfully brought the aircraft down on the sea. The crew got safely aboard the dinghy and some four hours later were rescued. During the time spent in the dinghy Wing Cdr. Chapman set a fine example which greatly inspired his comrades in a trying period. He has invariably displayed high qualities of leadership and tenacity.

Wing Cdr. R. D. SPEARE, D.F.C., R.A.F.O., No. 138 Sqn.—Since being awarded the Bar to the Distinguished Flying Cross, this officer has completed many sorties which have demanded a high degree of skill and resolution. He has at all times displayed great keenness and determination and his gallant example has inspired all with whom he has flown.

Act. Wing Cdr. C. McK. DUNNICLIFFE, D.F.C., R.A.F., No. 582 Sqn.—This officer has undertaken many sorties against various targets, including seven attacks on Berlin. He is an outstanding captain, whose keenness, courage and devotion to duty have set a splendid example. In addition to his work in the air, Wing Cdr. Dunnicliffe has shown a high degree of organising ability and great drive, and his untiring efforts have been reflected in the operational efficiency of the squadron he commands.

Act. Sqn. Ldr. G. BENNETT, D.F.C., No. 405 (R.C.A.F.) Sqn.—As captain of aircraft, Sqn. Ldr. Bennett has taken part in a very large number of sorties, during which he has successfully attacked such targets as Berlin, Mannheim and Munich. He has displayed skill of a high order, whilst his unconquerable spirit of determination and contempt for danger have been a notable feature of his efforts throughout. Sqn. Ldr. Bennett has rendered valuable service.

Act. Sqn. Ldr. R. J. K. HOGG, D.F.C., R.A.F.O., No. 90 Sqn.—This officer has completed three tours of operations, during which he has attacked a wide variety of enemy targets. He has dis-

played a high standard of keenness and devotion to duty throughout, and his successes are an excellent testimony to his great skill and courage. Sqn. Ldr. Hogg has set an example worthy of emulation.

Act. Sqn. Ldr. R. B. INGALLS, D.F.C., R.C.A.F., No. 582 Sqn.—Since being awarded the D.F.C., this officer has completed very many sorties, involving attacks on a wide range of important and well-defended targets. His navigational ability has been of a high order throughout and has played a good part in the successes obtained. He has at all times displayed a high degree of courage and determination, and his example has impressed all.

Act. Sqn. Ldr. L. F. RATCLIFF, D.F.C., A.F.C., R.A.F.V.R., No. 161 Sqn.—This officer has completed a very large number of sorties and has achieved much success. He is a fine leader, whose ability, confidence and resolution have been reflected in the high morale of his crews. Sqn. Ldr. Ratcliff has rendered much loyal and devoted service.

Flt. Lt. P. A. DOREHILL, D.F.C., R.A.F.V.R., No. 44 Sqn.—This officer has completed a second tour of operations, during which he has attacked Berlin on seven occasions. He has displayed outstanding skill, courage and devotion to duty, and his determination to press home his attacks has won him much success. His record has been most impressive.

Group Capt. (now Act. Air Comdre.) D. F. W. ATCHERLEY, D.F.C., R.A.F.—This officer has completed much operational flying and has achieved notable successes. He is a fearless leader, whose iron determination and unswerving devotion to duty have inspired all under his command. In addition to his work in the air, Group Capt. Atcherley has displayed a high standard of organising ability and great drive, and his services have been of inestimable value.

Act. Sqn. Ldr. E. J. CHIDGEY, D.F.C., R.A.F.V.R., No. 35 Sqn.—One night in June, 1944, this officer was captain of an aircraft detailed to lead an attack on important railway sidings in France. During the outward flight adverse weather was experienced. On arriving over the target, Sqn. Ldr. Chidgey, despite heavy rain, descended to an altitude of 1,000 feet in order to ensure the success of the attack. He then made five bombing runs across the objective, unperturbed by anti-aircraft fire, to which he replied with his guns. Sqn. Ldr. Chidgey on this occasion displayed a high order of courage and determination. Throughout his operational career, this officer has taken part in numerous attacks on enemy targets and has invariably performed his allotted tasks with outstanding gallantry and coolness.

Flt. Lt. H. McP. JOHNSTON, R.A.F.V.R., No. 635 Sqn.—One night in June, 1944, these personnel were captain, wireless operator and rear gunner respectively of an aircraft detailed to attack an important railway siding at Nantes. Owing to adverse weather and the pressure of heavy cloud over the target, it was found, on breaking cloud, that the aircraft was in an unfavourable position for attack. Despite danger from the powerful defences, Flt. Lt. Johnston manœuvred for a position from which a good bombing run could be started. While orbitting the target with this end in view, the aircraft was illuminated by searchlights and engaged by anti-aircraft fire. Severe damage was sustained and fire broke out in the rear of the bomber, which fell into a steep dive and became extremely difficult to control. Flt. Sgt. Ledgerwood reported that his parachute had been damaged by fire. The captain was still exerting all his strength in his efforts to control the aircraft when the rear turret fell off. The fire, still raging in the rear, was brought under control by the courage and tenacity of Flt. Sgt. Ledgerwood, who, though suffering from severe burns, extinguished it unaided. Flt. Lt. Johnston then decided, in spite of the precarious condition of the bomber, to try to reach the United Kingdom. With the assistance of the wireless operator, P/O. Padden, he managed to bring the aircraft more or less under control, and, after two hours of endeavour, reached an airfield in England. Throughout the return flight P/O. Padden rendered most valuable aid in the navigation of the aircraft and greatly assisted his captain in making a safe landing.

Bar to Distinguished Flying Cross

Act. Wing Cdr. R. A. MITCHELL, D.F.C., R.A.F.V.R., No. 605 Sqn.—This officer has completed numerous sorties and has destroyed three and assisted in the destruction of a fourth enemy aircraft at night; he has also executed several damaging attacks on locomotives. He is a keen and courageous fighter whose personal example and efficiency have been reflected in the fighting qualities of his flight which has won much success.

F/O. P. HULETSKY, D.F.C., R.C.A.F., No. 418 (R.C.A.F.) Sqn.—This officer continues to display the highest standard of skill and gallantry. Recently he has taken part in several sorties during which he has assisted in the destruction of four enemy aircraft.

P/O. E. W. BOAL, D.F.C., R.C.A.F., No. 418 (R.C.A.F.) Sqn.—Since being awarded the D.F.C., this officer has taken part in numerous sorties during which he has assisted in the destruction of nine enemy aircraft. He is an extremely efficient member of aircraft crew whose fearlessness and determination have set an inspiring example.

Flt. Lt. R. H. W. CLARKSON, D.F.C., R.A.F.V.R., No. 692 Sqn.—This officer has completed a very large number of sorties and has set a fine example of skill, courage and devotion to duty. Recently Flt. Lt. Clarkson took part in a mission in which most accurate and meticulous navigation was essential to the success. Despite fierce anti-aircraft fire and considerable searchlight activity, Flt. Lt. Clarkson guided his pilot to the target with unerring skill and thus contributed materially to the success achieved.

Wing Cdr. R. E. BURNS, D.F.C., R.A.F., No. 254 Sqn.—This officer has displayed a high standard of skill and gallantry, qualities which have been reflected in the fine fighting spirit of the squadron he commands. In June, 1944, Wing Cdr. Burns took part in a successful attack on a large concentration of enemy shipping. By his great tactical ability and fine leadership, Wing Cdr. Burns contributed in good measure to the success obtained.

Act. Sqn. Ldr. C. G. MILSON, D.F.C., R.A.A.F., No. 455 Sqn.—Since being awarded the D.F.C., this officer has completed numerous attacks on enemy shipping. He has led his striking forces with the greatest dash and his example has been most inspiring. In June, 1944, he flew the leading aircraft of a section which attacked a number of minesweepers near the Hook of Holland. In the face of intense anti-aircraft fire the attack was pressed home with exceptional resolution. Five of the ships caught fire. His contempt for danger has been a noteworthy feature throughout his tour.

Flt. Lt. G. E. BENNETT, D.F.C., R.A.F.V.R., No. 96 Sqn.—This officer continues to display the highest standard of skill, keenness and determination, and has assisted in the destruction of a further three enemy aircraft at night. He is a first-class observer, whose excellent work in the training of other members of the squadron has been attended with good results.

Act. Flt. Lt. W. F. E. THOMAS, D.F.C., R.A.F.V.R., No. 151 Sqn.—As observer this officer has participated in a large number of sorties. He has displayed exceptional skill and co-operation and has assisted in the destruction of nine enemy aircraft. His keenness and devotion to duty have been most commendable.

F/O. F. E. HOGG, D.F.C., R.N.Z.A.F., No. 605 Sqn.—Since being awarded the D.F.C. this officer has completed a large number of sorties, many of them far into enemy territory and often in adverse weather. He is an observer of high merit, and has played a worthy part in the successes obtained in attacks on a variety of targets, including railway installations and locomotives. F/O. Hogg has set an excellent example of determination and devotion to duty.

BOMBPHLETS : Surrender leaflets being loaded into special bombs to be dropped by Typhoons on the Germans. A small detonator scatters the leaflets.

Distinguished Flying Cross

F/O. C. M. BOLGER, R.C.A.F., No. 407 (R.C.A.F.) Sqn.
F/O. W. R. BREITHAUPT, R.C.A.F., No. 239 Sqn.
F/O. J. A. KENNEDY, R.A.F.V.R., No. 239 Sqn.
F/O. W. A. T. STEWART, R.C.A.F., No. 418 (R.C.A.F.) Sqn.
P/O. A. K. SAUNDERS, R.N.Z.A.F., No. 277 Sqn.
Act. Sqn. Ldr. W. B. ANDERSON, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. D. P. JANDRELL, R.A.F.V.R., No. 260 Sqn.
Act. Sqn. Ldr. T. MCPHEE, D.F.M., R.A.F.V.R., No. 464 (R.A.A.F.) Sqn.
Flt. Lt. A. C. CARTER, R.A.F.V.R., No. 109 Sqn.
F/O. E. W. GARRETT, R.C.A.F., No. 109 Sqn.
P/O. R. C. REINELT, R.A.F.V.R., No. 433 (R.C.A.F.) Sqn.
P/O. F. A. W. J. WILSON, R.C.A.F., No. 441 (R.C.A.F.) Sqn.
W/O. R. J. HENDERSON, R.A.A.F., No. 210 Sqn.
Wing Cdr. A. GADD, R.A.F.O.
Act. Flt. Lt. K. T. DAVIES, R.A.F.V.R., No. 578 Sqn.
Act. Flt. Lt. G. A. MILES, R.A.F.V.R., No. 578 Sqn.
Act. Flt. Lt. G. H. PROBERT, R.A.F.V.R., No. 630 Sqn.
F/O. W. MCINTOSH, D.F.M., R.A.F.V.R., No. 207 Sqn.
P/O. C. B. SUTHERLAND, R.C.A.F., No. 207 Sqn.
F/O. I. SHERMAN, R.C.A.F., No. 162 Sqn.
W/O. J. M. CUNNINGHAM, R.A.F.V.R., No. 166 Sqn.
Act. Sqn. Ldr. C. MERRICK, R.A.F.V.R., No. 295 Sqn.
W/O. H. E. FARROW, R.A.F.V.R., No. 295 Sqn.
Flt. Lt. O. W. KINGDON, R.A.F.V.R., No. 295 Sqn.
Flt. Lt. K. W. RICHARDSON, No. 295 Sqn.
Flt. Lt. N. D. MACKERTICH, R.A.F.V.R., No. 277 Sqn.
Flt. Lt. G. O. S. WHITTY, R.A.F.V.R., No. 296 Sqn.
F/O. G. L. WILSON, R.A.F.V.R., No. 296 Sqn.
W/O. W. A. RICKARD, R.A.F.V.R., No. 297 Sqn.
W/O.2 D. H. BALMER, R.C.A.F., No. 570 Sqn.
Air Comdre. J. N. BOOTHMAN, C.B., A.F.C.
Flt. Lt. G. W. ATKINS, R.A.F.V.R., No. 464 Sqn.
Act. Flt. Lt. D. DAVIES, R.A.F.V.R., No. 78 Sqn.
Act. Flt. Lt. W. RODNEY, R.C.A.F., No. 78 Sqn.
F/O. H. F. GRIMBLE, R.C.A.F., No. 78 Sqn.
Act. Flt. Lt. G. M. BURCHER, D.F.M., R.A.A.F., No. 10 Sqn.
F/O. E. A. TANSLEY, R.A.F.V.R., No. 158 Sqn.
P/O. B. D. BANCROFT, R.A.A.F., No. 158 Sqn.
P/O. A. F. C. FRIPP, R.A.A.F., No. 158 Sqn
P/O. R. T. PADDEN, R.A.F.V.R., No. 635 Sqn.—For citation see Flt. Lt. Johnston, D.S.O.
Act. Wing Cdr. A. D. MITCHELL, A.F.C., R.A.F., No. 226 Sqn.
F/O. D. G. FARQUHAR, R.A.F.V.R., No. 226 Sqn.
Act. Sqn. Ldr. T. E. ISON, R.A.F.O., No. 156 Sqn.
Act. Flt. Lt. W. J. BELL, R.A.F.V.R., No. 15 Sqn.
Act. Flt. Lt. G. M. CLAYDON, R.A.F.V.R., No. 15 Sqn.
Act. Flt. Lt. E. J. MOORE, R.A.A.F., No. 15 Sqn.
Act. Flt. Lt. W. J. TAGGART, R.A.A.F., No. 156 Sqn.
F/O. H. W. BARNHART, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. J. S. EKBERY, R.A.F.V.R., No. 145 Sqn.
F/O. W. W. ROBSON, R.C.A.F., No 428 (R.C.A.F.) Sqn.

Distinguished Flying Medal

Flt. Sgt. J. H. FRIEND, R.A.F.V.R., No. 514 Sqn.
Sgt. J. C. WILSON, R.A.F.V.R., No. 514 Sqn.
Flt. Sgt. J. C. PAYNE, R.A.A.F., No 455 (R.A.A.F.) Sqn.
Flt. Sgt. A. W. HAMMOND, R.A.F.V.R., No 278 Sqn.
Sgt. D. R. ARUNDEL, R.A.F.V.R., No. 158 Sqn.
Flt. Sgt. J. H. LEDGERWOOD, R.A.F.V.R., No. 635 Sqn.—For citation see Flt. Lt. Johnston, D.S.O.
Flt. Sgt. J. L. BOWMER, R.A.F.V.R., No. 10 Sqn.
Sgt. D. M. S. CAMPBELL, R.A.F.V.R., No. 10 Sqn.

THE KING has been graciously pleased to approve the following awards:—

O.B.E. (Mil.)

Sqn. Ldr. E. R. BROWN, R.A.F.V.R.—In February, 1944, a Mosquito aircraft crashed and caught fire when approaching to land. The pilot was killed instantly but the observer was alive and rescue parties tried in turn to extricate him from the blazing wreckage. Party after party failed and each attempt became more difficult owing to the increasing heat of the fire in the cockpit area of the wreckage. Eventually, Sqn. Ldr. Brown, the Station medical officer, and Cpl. Greenwood made a final and desperate effort as the situation had become critical because the supplies of foam were exhausted temporarily and the fire remained unchecked for some minutes. If their effort failed it was clear that immediate amputation of the observer's leg was the only way by which he could be released. Displaying extreme courage, Sqn. Ldr. Brown and Cpl. Greenwood withstood the intense heat of the flames and, by the skilful use of the tools at their disposal, succeeded in breaking away the wreckage which was trapping the observer's leg. They then removed the airman to the ambulance. While first aid was being rendered, Sqn. Ldr. Brown returned to the wreckage to make certain that the pilot was not

alive. This officer and airman displayed outstanding courage and determination.

B.E.M. (Mil.)

Sgt. R. T. BUNT, R.C.A.F.—Sgt. Bunt was the tail gunner in an aircraft which crashed and burst into flames during practice flying one night in March, 1944. He was thrown clear and stunned, but did not suffer any serious injury or burns. On hearing cries from the wireless operator, who was trapped in the blazing wreckage, Sgt. Bunt attempted to reach him, approaching the aircraft from the side furthest from the most intense part of the fire and the fuel tanks. Even so, heat compelled him to retire, but he again attempted an approach, this time passing near to the blazing fuel tanks. He eventually succeeded in dragging the wireless operator, whose clothes were on fire, to safety and remained with him until help arrived. This was achieved just before the petrol tanks exploded. In rescuing his companion, Sgt. Bunt sustained burns to his face and wrists, and it was subsequently found that he had sustained a fractured humerus. This airman displayed great bravery under harassing circumstances.

Cpl. J. S. O'SHEA, A.A.F., No. 81 Sqn.—During a low-flying attack on our aircraft operating behind the Japanese lines, an aircraft on the ground was set on fire and its pilot was seriously injured. Disregarding the attackers and the fire, Cpl. O'Shea left his slit trench and ran to the aid of the pilot, whom he assisted from his burning aircraft. Later, with the help of another airman, Cpl. O'Shea carried the pilot a distance of 30 yards and applied a tourniquet to stem the flow of blood.

L.A/C. E. G. W. HILL, R.A.F.V.R., No. 14 Sqn.—In February, 1944, an aircraft crashed and caught fire. The crew were badly injured and trapped in the blazing wreckage. L.A/C. Hall, who was the first to arrive on the scene of the accident, immediately plunged into the flames in an endeavour to rescue the injured airmen. Despite the danger from the exploding ammunition and petrol tanks, he succeeded in dragging two of the airmen to safety. L.A/C. Hall's gallant and prompt action undoubtedly saved two lives.

Flt. Sgt. G. P. WHIMPEY, R.A.A.F.—One night in May, 1944, Flt. Sgt. Whimpey was the rear gunner of a Stirling aircraft which crashed and caught fire after stalling at an altitude of 300 feet. Five of the crew were killed, but this airman was in his turret, which was torn from the aircraft and flung some distance away from it. Flt. Sgt. Whimpey was thrown out of the turret and, although he was uninjured, he suffered badly from shock. Despite this experience, he was one of the first to enter the blazing wreckage and rendered most valuable service in extricating other members of the crew. Throughout the rescue work there was considerable danger from exploding ammunition, and the fuel tanks blew up with an explosion which shook buildings two miles distant. Flt. Sgt. Whimpey continued to render assistance courageously until the medical officer ordered him to go to the ambulance.

Foreign Decorations

THE KING has granted unrestricted permission for the wearing of the undermentioned decorations, conferred upon the personnel indicated, in recognition of valuable services rendered in connection with the war:—

Conferred by the President of the Czechoslovak Republic

Silver Medal of Merit (1st Class)

Flt. Lt. L. D. FORD, R.A.F.V.R.
Flt. Lt. F. W. MERRING, R.A.F.V.R.
Flt. Lt. F. V. VAN DER BIJL, R.A.F.V.R.
Flt. Lt. A. WALSHAM, R.A.F.V.R.
Act. Flt. Lt. W. P. JOWETT, R.A.F.V.R.
Act. Flt. Lt. J. W. E. PARSONS, R.A.F.V.R.
Act. Flt. Lt. S. C. I. TAGGART, R.A.F.V.R.
F/O. F. P. BLENCOWE, R.A.F.V.R.
L.A/C. J. E. WALKER, R.A.F.V.R.

Bronze Medal of Merit (2nd Class)

Flt. Sgt. G. HARDY, R.A.F.
Flt. Sgt. R. R. SKINNER, R.A.F.
Cpl. M. A. BRACEY, A.A.F.
Cpl. S. W. RIDDELL, R.A.F.V.R.

Roll of Honour

Casualty Communiqué No. 422.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list, 102 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. M. L. Edwards; F/O. J. Hart; Sgt. A. Kennaway; Sgt. H. K. Pell; Sgt. F. J. Ramsay; Sgt. H. V. Rowe; F/O. E. Talbot, D.F.C.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. P. M. Adams; Sgt. W. T. Adamson; Flt. Sgt. R. A. Collins; Act. Flt. Lt. L. A. Harden; Sgt. G. F. Haskings; P/O. L. G. Heaney; Sgt. R. T. Johnson; Sgt. E. Mallin; P/O. A. H. Petty; Sgt. W. E. Price; Sgt. W. Quinn; Sgt. S. B. Watson; Flt. Lt. R. F. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. B. E. E. Allden; Sgt. J. D. Ashley; Sgt. M. S. Baras; Sgt. T. Barnett; Sgt. R. Barrass; Sgt. A. E. Best; W/O. A. L. Brigden; Sgt. A. C. Brooksbank; P/O. A. J. E. Brown; P/O. C. MacD. Brown; Sgt. J. A. Buck; Flt. Sgt. D. Burke; Sgt. E. G. Burnett; F/O. V. C. Bye; Sgt. H. Cameron; Sgt. P. A. R. Chauncey; Sgt. G. E. W. Coombs; Flt. Sgt. T. K. Cooper; Sqn. Ldr. A. P. Craigie, D.F.C.; W/O. H. E. Curtis; Sgt. K. W. Darrah; P/O. T. H. Davies; Sgt. P. E. Duckers; Sgt. W. Duncanson; Sgt. K. F. Dunford; Sgt. W. D. Evans; P/O. N. Gardner; P/O. B. J. Gerrett; P/O. C. C. Goff; Flt. Sgt. M. T. T. Hall; Flt. Sgt. W. E. Haslam; Flt. Sgt. S. Hatton; Sgt. A. E. T. Hill; Act. Sqn. Ldr. W. H. B. Hiles, D.S.O., D.F.C.; Sgt. F. Hindley; Flt. Sgt. A. B. S. Howat; Sqn. Ldr. D. W. S. Howroyd; Flt. Lt. R. T. Hunter; F/O. E. E. Huxter; Sgt. T. H. R. James; Sgt. P. C. Jones; Flt. Sgt. R. G. Kelly; Sgt. A. J. King; P/O. L. R. King, D.F.M.; P/O. T. C. Latham; Sgt. J. R. Laing; Wing Cdr. E. J. Little, D.F.C.; Sgt. S. Lloyd; Sgt. J. W. Lowe; Sgt. W. Lowe; P/O. A. McNair; F/O. J. P. Mahoney; Sgt. D. G. Malley; P/O. S. G. Mills; Sgt. C. J. E. Moody; Flt. Sgt. R. A. Moore; Sgt. G. A. Nelson; Sgt. A. T. Newton; Sgt. J. Nuttall; F/O. F. E. Phillips; Sgt. A. Purrington; Sgt. J. F. Quickfall; Sgt. F. G. Reeson; P/O. J. A. Reid; P/O. P. J. Ryan; Flt. Sgt. F. A. Sherrington; Sgt. T. Smale; Sgt. J. G. Smith; Sgt. J. W. E. Sutherland; Sgt. C. W. Sweeting; Flt. Sgt. R. E. Taylor; P/O. H. S. Thew; Sgt. J. Thomas; Sgt. L. Vaughan-Harrison; Sgt. T. E. Wadeson; P/O. W. Wardrop; Sgt. A. Williams; Sgt. H. Williams; P/O. J. E. Woodgate.

WOUNDED OR INJURED IN ACTION.—F/O. P. G. West.

MISSING, BELIEVED KILLED IN ACTION.—P/O. R. R. Brant; Sgt. D. S. Bruty; Flt. Sgt. L. C. Clutterbuck; Flt. Sgt. A. W. Cooper; P/O. P. J. Dukelow; F/O. L. R. Dunham; Flt. Sgt. T. G. Franklin; Sgt. A. L. Green; F/O. J. D. Hegarty; Sgt. R. W. Kemp; Flt. Sgt. D. J. Lush; Sgt. G. A. McEwan; Sgt. L. J. Making; Sgt. T. J. Meehan; Sgt. J. Moffat; Sgt. F. Parish; Sgt. F. R. Read; Flt. Sgt. M. B. Rumbles; Sgt. A. A. Short.

MISSING.—P/O. A. J. Alcott; Flt. Sgt. R. M. Atkinson; Sgt. R. W. Ball; Flt. Sgt. D. F. B. Bell; Sgt. V. L. Bennett; Flt. Lt. L. F. Berry; Flt. Sgt. S. Binns; Sgt. C. Bird; Sgt. A. W. C. Bugden; Flt. Sgt. R. R. Bunker; P/O. G. H. S. Burwood; Flt. Sgt. A. M. Carew-Gibbs; Sgt. F. Cartwright; Flt. Sgt. W. S. Comfort; Sgt. A. C. Connor; Flt. Sgt. L. W. Cook; Sgt. L. Cottrell; Sgt. E. Critchley; Flt. Sgt. R. Davidson; Sgt. S. Dickinson; Sgt. D. Dickson; Sgt. L. S. Dwan; Act. Flt. Lt. E. L. Eames; Sgt. J. W. Eastman; Sgt. H. Eckford; F/O. N. C. M. Edwards; Sgt. T. Edwards; Sgt. H. R. Elsbury; F/O. G. Ferguson; Sgt. E. D. Foulkes; Sgt. A. Friesner; Sgt. R. Gill; Sgt. H. DeG. Griffiths; Flt. Sgt. J. Hamilton; Flt. Sgt. S. A. Hancock; F/O. I. J. G. Hart; F/O. G. W. Hemsley; Sgt. J. Herkes; F/O. F. B. Hill; Flt. Sgt. J. Hodgkins; F/O. M. H. Hughes; Sgt. W. Impey; Sgt. S. A. Jarvis; Sgt. E. M. John; Sgt. C. Jones; Sgt. S. L. W. Kelly; Sgt. J. Kiltie; Sgt. K. L. G. Le Heup; Sgt. C. Lister; Sgt. T. McCluskey; Sgt. A. P. C. McCulloch; Sgt. R. Margerison; Sgt. J. R. Martin; F/O. A. G. Maskall; Sgt. D. A. W. Mayo; P/O. F. H. R. Moody; Sgt. R. Morris; W/O. G. A. Mould; Sgt. P. M. Murphy; Act. W/O. H. F. G. Murray; Flt. Sgt. E. Nelson; P/O. M. G. Nelson; Flt. Sgt. S. Norris; Sgt. G. P. O'Connor; F/O. E. O'Donoghue; Sgt. W. F. O'Neill; Sgt. F. C. Pallett; Sgt. E. Parry; Flt. Sgt. D. F. Parsons; Sgt. C. A. Partridge; Sgt. A. F. Patmore; P/O. F. I. Peck; W/O. J. A. Porter; Sgt. R. W. Pryce; Flt. Lt. F. R. Randall; Sgt. W. B. Rankin; Sgt. R. B. Reeves; Act. Flt. Lt. A. T. Richards; Sgt. N. C. Richmond; Sgt. D. Rimmer; Sgt. R. Robinson; Sgt. A. Roderick; Sgt. E. J. Rowlands; Sgt. G. W. D. Scott; Sgt. E. R. Searles; Flt. Lt. J. W. S. Skinner; Flt. Sgt. E. G. Small; F/O. D. A. J. Smith; Sgt. F. R. Smith; F/O. L. J. Solomon; Sgt. F. W. Sowerby; Sgt. P. A. Tanneu; P/O. C. E. R. Tanner; Flt. Sgt. H. S. Thomas; Act. Flt. Lt. T. M. Thomas; Flt. Sgt. P. Tweedy, D.F.M.; Sgt. J. A. Vick; Sgt. J. F. Vincent; Flt. Sgt. J. K. R. Vincent; F/O. L. V. Warboys; Sgt. C. Webster; Sgt. G. West; Sgt. C. Woodmass; Sgt. B. H. Wright; Flt. Sgt. M. A. Zollo.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. D. W. D. Greenop; L.A/C. J. A. Smith.

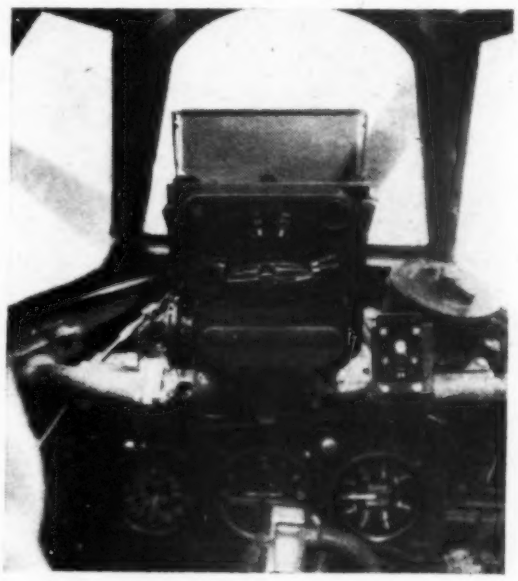
KILLED ON ACTIVE SERVICE.—Sgt. S. W. Doughty; Flt. Lt. W. G. Evans; Flt. Sgt. R. E. Gray; Sgt. H. Judge; Sgt. R. M. Lane; Sgt. E. G. A. Marnham; F/O. R. J. Morris; Sgt. E. Payne; W/O. A. L. Potter; Sgt. N. H. Powell; Sgt. H. Riley; Flt. Sgt. J. Rutter; Sgt. S. N. Tabron; Sgt. R. W. Torrie; Sgt. J. A. Treby.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. G. S. Fitton; Cpl. E. T. Greaves; Flt. Lt. G. D. Ingleton; Flt. Sgt. L. J. Nunn; Sgt. A. V. Pavey; F/O. K. W. Wright.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. C. S. Nickson.

DIED ON ACTIVE SERVICE.—L.A/C. C. Heptinstall; L.A/C. W. J. Lawrence; Sgt. T. D. Purves.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. J. H. Hymas; Flt. Sgt. J. A. Penny.



MAKING CERTAIN SURE: The new Mk IID gyro gun-sight which is now the standard gun-sight on fighter aircraft. Instead of assessing the span of the enemy, the various German aircraft are marked on the setting dial.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. P. S. Davenport.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. S. Wilkins.

MISSING.—W/O. W. W. Beavan; W/O. M. M. Bettington; W/O. J. E. Browne; W/O. L. W. Cain; W/O. C. Faust; W/O. F. J. Keegan; Flt. Sgt. J. W. A. Montgomery; Flt. Sgt. W. J. Moody; P/O. S. W. Newman; P/O. K. C. Page; Flt. Sgt. V. L. W. Phillips; Flt. Sgt. L. J. Pulbrook; Act. Flt. Lt. L. C. A. Taylor; P/O. C. K. Thomas; P/O. A. L. Smith.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. A. Tuckwell.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Act. Sqn. Ldr. L. J. Simpson, D.F.C.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. C. A. Blackmore; F/O. F. C. Bowring; P/O. W. H. Geddes; Sgt. B. Gordon; F/O. D. G. W. McKie; F/O. L. J. Smith; Sgt. A. H. Spinks.

WOUNDED OR INJURED IN ACTION.—P/O. F. T. Hubbard.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. D. H. Bond; F/O. G. L. King.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. R. L. N. Guillot; W/O. A. A. Jepson; P/O. D. S. Kirkwood; P/O. H. E. MacDuff; Flt. Sgt. L. R. Towsley.

MISSING.—Flt. Sgt. A. A. Anderson; P/O. H. Barker; Sgt. D. P. Bernhardt; F/O. H. J. P. Brennan; Sgt. A. W. Brickenden; F/O. A. J. A. Bryan; Sgt. F. S. Brydon; F/O. T. Carnegie; F/O. J. M. Cowie; F/O. W. G. Crawford; F/O. J. P. Gallagher; Flt. Lt. W. M. Hale; F/O. T. R. Hodgson; Sgt. W. J. Jeffrey; Flt. Sgt. K. L. D. McCoy; P/O. R. E. McDougall; Sgt. J. R. McWade; Flt. Lt. R. W. Nickerson; F/O. P. P. Pochailo; Flt. Sgt. W. F. Reid; F/O. J. Specter; Flt. Sgt. S. D. Spencer; Flt. Sgt. T. P.

SERVICE AVIATION

Sterling; F/O. W. T. Woodall; F/O. J. Zywina.

KILLED ON ACTIVE SERVICE.—L.A/C. V. E. Ahlskog; F/O. C. G. Archibald; Sgt. W. O. D Baird; F/O. W. Campbell; Sgt. R. T. Dean; Wing Cdr. J. P. J. Desloges; Sgt. T. Goldie; F/O P. W. Henderson; F/O. R. G. Hills; W/O. J. S MacDonald; F/O. J. R. P. Markowski; Sgt. G. W. Mitchell; Sgt. J. R. Pollon; F/O. D. E. Roberts; Sgt. V. T. Sherven; P/O. L. L. Williams.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. S. W. Smith.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. D Harris; Act. Flt. Lt. W. B. Smith.

MISSING, BELIEVED KILLED IN ACTION.—W/O. F. W. Buckley.

MISSING.—W/O. J. A. Ashdown; Flt. Sgt. R. H. Brown; F/O. M. F. Cullen; Flt. Sgt. A. A. Ferguson; F/O. J. Gall, D.F.C.; Flt. Sgt. A. L. Kay; W/O. G. H. Shearer; F/O. W. Tye; P/O. W. J. Willis.

South African Air Force

KILLED IN ACTION.—2/Lt. J. N. Hall; 2/Lt. C. S. Saunders.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Lt. W. C. Botha; Lt. Col. J. N. Robbs, D.F.C.; 2/Lt. R. K. Townsend.

Casualty Communique No. 423

Of the names in this list, 100 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. R. L. Aston; Sgt. I. H. Dick; Sgt. H. G. Eggbeer; Cpl. G. Fenn; Sgt. A George; W/O. J. S. Jarrett; P/O. R. T. Jenkins; Sgt. B. Pearce; Sgt. J. J Phillips; Sgt. L. Sharpeu; F/O. T. Quayle; Sgt. P. Vose; Flt. Sgt. W. Whalley; Act. Flt. Sgt. J. Whyte.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. P. Arnold; Sgt. R. Askwith; Sgt. D. J. Atkinson; F/O. J Austin; Sgt. H. Basnett; Sgt. J. A. Beck; P/O. T. J. Bowling; Sgt. E. W. Brearley; Sgt. H. F. Burrett; Sgt. L. W. Bush; P/O. J. I. F. Byrne; P/O. M. P. Callaway; Flt. Sgt. J. Cassidy; Sgt. R. D Collis; Sgt H. W. Cooke; F/O. J. L. De'Ath; Sgt. W. E. Dixon; Sgt. D. T. F. Doyle; Sgt. F. J. Edser; Sgt. B. A. Fear; Sgt. W. A. Finlay; Sgt. G. F. Fox; Flt. Sgt. L. H. E. Gittins; F/O. P. L. Green; Sgt. W. Green; Sgt. E. A. Hall; Flt. Sgt. G Harper; Sgt. T. J. Hegarty; F/O. J. Hillen; Sgt. P. Hinson; Sgt. E. Hollamby; Sgt. H. K. Hollidge; F/O. J. P. Ingham; Sgt. L. T. Johnson; F/O. K. W. Jones; Sgt. S. W. Kent; Sgt. G. Leedham; Sgt. E. R. Lowe; Sgt. G. D. Mair; F/O. J. Nesden; Sqn. Ldr. G. C. Matheson; Sgt. V. Moore; Sgt. D. G. Morrison; Sgt. J. H. Naylor; Flt. Sgt. A. E. G Nunn; Sgt. C. W. E. Palmer; Sgt. T. A. Pargeter; Sgt. R. J. Partridge; Sgt. L. Pelmear; Sgt. B. A. Phillis; Act. Flt. Lt. P. W. D. Reading; Flt. Sgt. R. D. Schwardt; Sgt. R. Skillin; Flt. Sgt. H. Smedley; Sgt. W. C. Smirk; P/O. W. W. Smith; Sgt. H. Taylor; Sgt. C. W. Tomlinson; Sgt. F. J. A. Trigg; Flt. Sgt. J. F. Trotter; Sgt. D. M. Walder; Sgt. D. V. Webb; Sgt. J. Whittaker; Flt. Sgt. G. P. Wilkinson; Sgt. R. R Wilson; Sgt. M. E. Windsor; P/O. R. A Winn; Sgt. P. E. Worsley; F/O. W. H. J Yeo.

WOUNDED OR INJURED IN ACTION.—Sgt. R. H. Bingham.

MISSING, BELIEVED KILLED IN ACTION.—P/O. L. J. Baker; W/O. R. C. W. G. Baker; Sgt. G Bennett; Sgt E. J. Brittain; Sgt. J. H. Crane; Sgt. R. W England; Sgt. F. A. Farrell; F/O. K. D. Goddard; Sgt. J. W. Johnson; Sgt. J. P. C. Johnstone; Sgt. J. Lowery; Sgt. R. M. McClure; F/O J. McKee; F/O. D. W. Major; F/O. N. Morrad; Flt. Sgt. J. H. Myers; Sgt J P Olive; Flt Sgt. A. W. Oram; Sgt. D. F. A. Peach; Sgt. A. L. Puckering; Sgt. N. B. Pike; Act. Flt. Sgt. N. A. Rawlinson; Sgt. W. Smith; Sgt W. C Truman; F/O. J. Turner; Act. Flt. Sgt. B. W. Webb; F/O. R. F Wilcock; F/O. G. H. Wright.

MISSING.—Sgt. R. W. Abrams; Flt. Lt. P. R Aitken; F/O. J. C. O. Allan; Sgt. P. D. Andrew; F/O. P. S. Arnold; Sgt. A. M. Armin; W/O. F. Balloch; Sgt. F. W. Bellamy; Sgt. G. Bellman; Sgt. A. H. Brown; Act. Sqn. Ldr. M. Bryan-Smith, D.F.C.; Sgt. K. J Cameron; Sgt. A. S Campbell; Sgt. H. Carmichael; Act. Wing Cdr E. J. Carter, D.F.C.; F/O. F. H Cattermoul; Flt. Lt. A. Chambers, D.F.C.; Sgt. D. J. K Churchouse; F/O. F. A. N. Clifton; Sgt. G E. Crumpler; Sgt. G. F. Davis; Flt. Sgt. W. H. De Viell; Sgt. D. P. Duggan; P/O. G. E. Dunning; Act. Flt. Lt. A. Feeley; Sgt W. Fletcher; Sgt. J. F. J. Forrest; Sgt. D. W Fussell; Sgt. D. C. Gallacher; Sgt. L. T. Gearing; F/O. G. B. Gingell; Sgt. N. M. Goldberg; P/O. A. F. Goodall; Sgt. J. Graham; P/O. P. R. Graves-Hook; F/O. A. C. A. Greenfield; Flt. Sgt. L. W. Guggiari; Flt. Sgt. R. Haine; Sgt. R. F. E. Haly; Flt. Sgt. P. J. Hamilton; Sgt. J Hanna; W/O. W. A. Hannaford; Sgt. R. H. S. Hart; Sgt. D. J. Harvey; Flt. Sgt. E. P. Hawkes; Sgt. W. J. Hayman; P/O. A. F. Heath; Flt. Sgt. A. M. Henderson; P/O. F. N. Henley; Flt Sgt. G D. Hetherington; F/O. E. L. Hogg; Sgt. E. Hopkinson; F/O. J. P. Hornby; Sgt. R. J. Hughes; Sqn. Ldr. C. J. K. Hutchins; F/O. H. W. E. Jeffery, D.F.M.; Flt. Lt. D. Johnson, D.F.C.; Sgt. E. G. Jones; P/O. G. Jones; Flt. Sgt. R. F. Kebbell; W/O. H. Kitto; Flt. Sgt. K. G. Lawrence; Flt. Sgt. G. H. Little; Flt. Sgt. G. F. Livingstone; F/O. A. G. Lodge; P/O. J. E. Lott; Sgt. W. Low; Sgt. W. D. Low; Flt. Sgt. W. C. McCoy; Sgt. W. E. McIllwaine; Sgt. D. P. Mangan; Sgt. J. Manson; F/O. J. C. Marland; Sgt. G. A. Maund; Sgt. L. H. Milligan; Sgt. N. R. Millward; Flt. Sgt. S. Morris; Sgt. H. A. Nightingale; Sgt. R. G. Norris; Sgt. W. T. N. Norris; Sgt. H. P. Page; P/O. J. N. Papworth; Flt. Sgt. W. M. Patterson; Sgt. F. A. Pearce; W/O. J. V. Pearson; F/O. D. E. F. Potter; Sgt. K. Powell; Sgt. A. E. Price; F/O. G. L. Ramsay; Act. Sqn. Ldr. A. W. Raybould, D.S.O., D.F.M.; Sgt. G. Reid; P/O. E. J. Roe; Sgt. S. H. Seaforth; F/O. F. E. Sinden; Sgt. K. O. Smith; Sgt. J. W. J. Spiller; Act. Flt. Lt. W. A. Stratis, D.F.C.; Flt. Lt. G. J. Summers; Sgt. L. Thomas; Flt. Sgt. P. H Thomas; Flt. Sgt. J. H. Tucker; P/O R. C. H. Wakeley; P/O. F. R. Watson; F/O. R G. Watkins; Sgt. E. E. J. Wiggins; Flt. Sgt. L. E. Williams; Sgt. J. Wilson; Flt. Sgt. A. R. Wincott; Flt. Lt. E. D. Woodward; P/O. D. E. Woolley; F/O. G. H. Wyand.

KILLED ON ACTIVE SERVICE.—Sgt. F. Bates; Sgt. E. W. Blakeman; Sgt. W. Boyes; F/O. J. M. Brooks; F/O. J. R. Campbell; Flt. Sgt. E. Cotterell; Sgt. N. H. Crawford; Sgt. D. W. Curtis; F/O. D. A Driver, D.F.M.; Act. Flt. Lt. H Drury; W/O. W. E. Duke; W/O. P. Galletly; W/O. F. Hooper; L.A/C. H. K. Jones; Sgt. W. J. Lawton; Flt. Sgt. J. H. McGregor; Sgt. J. H. Nixon; Sgt. J. A. Oliver; Sgt. F. J. Pace; Sgt. T. Parr; Sgt. F. C. Putwain; Flt. Sgt. T. D Quinn; Sgt. G. Sinclair; P/O. W. Sumner; P/O. S. R. Wilson.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. D. Cox; F/O. W. H. Dixon; Sgt. J. R. Dodsworth; Sgt. D. B. Moon.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Act. Flt. Lt. K. Gate; Sgt. R. B. Glasswell; Sgt. J. McGoldrick.

DIED ON ACTIVE SERVICE.—Act. Flt. Lt. E. C Bulmer; A/C.1 J. A. Gourley; L.A/C. E. V Jones; A/C.1 R. B. A. Marshall; Sgt. W. Rutherford; A/C.1 A. J. Wale.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. T. Taylor.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. H. Braine; Flt Sgt. T. J. Brassel; F/O. J. M. Curtis; Flt. Sgt. R. E. Dallwitz; Flt. Sgt. R. I. Gates; Flt. Sgt. R. H. Hallam; Flt. Sgt. H. C. Harber; Sgt. J. H. D. Herbeate; P/O. F. G. Matthews; W/O C. A. Mattrass; P/O. L. K. Needs; Flt. Sgt. E. J. Phillips; Flt. Sgt. L. G. Potts; Act. Flt. Lt. A. J. L. Sedunary; Flt. Sgt. E. R. Smart; P/O. V. G. Stabell; F/O. A. M. Welch.

MISSING, BELIEVED KILLED IN ACTION.—P/O. E. F. Champness; Flt. Sgt. W. C. Chandler; F/O. W. D. McKay; Flt. Sgt. K. C. Waight.

MISSING.—W/O. W. J. Atkinson; Flt. Sgt. M. R. Burgess; Flt. Sgt. B. F. Cody; Act. Flt. Lt. R. J. Conley; F/O. H. R. Crout; P/O. P. C. L. Dombrain; P/O. D. Hislop; Flt. Sgt. A. S. Long; P/O. K. W. McSweeney; F/O. J. R. Morschel; Flt. Sgt. S. A. Nystrom; Flt. Sgt. F. B. Reid; Act. Flt. Lt. K. Roberts, D.F.C.; Flt. Sgt. N. L. Sorensen; Act. Flt. Lt. G. C. Startin; F/O. J. F. Tucker; P/O. R. G. Ward; P/O. A. W. Wilson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. C. J. Jamison.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. A. F. Brown; W/O. A. Dunae; F/O. W. G. Hunter; Sgt. J. W. Leitch; Sgt. P. J. McCrory; Sgt. L. E. Morris; F/O. J. W. Paige; F/O. W. E. Scott.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. J. Fearn; F/O. J. E. J. A. Robert.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. K. C. Cherer; P/O. C. Cleland; Flt. Sgt. S. J. McIlrath; Act. Flt. Lt. I. McIntyre; Flt. Sgt. D. C. McKenzie; Flt. Sgt. F. H. Schull; Flt. Sgt. V. H. Shea; P/O. O. J Thorpe; W/O. R. E. Vanderbeck.

MISSING, BELIEVED KILLED IN ACTION.—F/O E. J. Andrews; Sqn. Ldr. G. S. Beall; Sgt. C. M. Beauregard; Sgt. H. J. Cunningham; Sgt. G. Gow; F/O. W. B. Jardine; Flt. Sgt. S. W. Little; Flt. Sgt. F. D. Maddock; W/O. G. M. Naugler; F/O. J. F. Robinson; Sgt. R. N. Simpson; Sgt W. C. Stainton.

MISSING.—Flt. Sgt. H. E. Bailey; Flt. Lt E. W. Beattie; P/O. C. D. Brown; W/O. J. O Burke; W/O. K. M. G. Fleming; Flt. Lt. J. P Flynn; F/O. T. E. Frair; F/O. H. Freeman; F/O. A. H. Grange; Flt. Sgt. J. H. Hamilton; Sgt. W. Hickox; F/O. G. E. Holly; F/O. W. G. W. Johnson; Sgt. P. Kalyta; W/O. F. M. Linton; F/O. L. E. Mason; W/O. O. J. Mohler; Sqn. Ldr. W. R. Pettit, O.B.E., D.F.C.; F/O. H W. Rieger; F/O. W. W. Rohkopf; P/O. J. C Seely; W/O. C. Senton; F/O. T. R. Sherrill.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. W. Blair, W/O. E. W. Burrows.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. A. G McKenzie.

Royal New Zealand Air Force

MISSING.—Flt. Sgt. L. S. Jamieson; Flt. Sgt. A. McR. McLachlan; Flt. Sgt. B. O'Brien; Flt. Sgt. A. G. Partridge.

FOR SPEARHEAD COVER: Long-range fuel tanks being unloaded from a transport Dakota in Southern France.